INDEX NUMBER

Next Meeting, The American Association of Orthodontists, San Francisco, California, May 8 through 12, 1955. Headquarters, The Fairmont Hotel.

AMERICAN JOURNAL OF ORTHODONTICS

OFFICIAL PUBLICATION OF
THE AMERICAN ASSOCIATION OF ORTHODONTISTS,
ITS COMPONENT SOCIETIES, AND
THE AMERICAN BOARD OF ORTHODONTICS

UNIVERSITY OF MICHIGAN
DEC 10 1954
DENTISTRY LIBRARY
c.4

Editor-in-Chief

H. C. POLLOCK, ST. LOUIS, MO.

Assistant Editor

EARL E. SHEPARD, ST. LOUIS, MO.

Editor of Abstracts and Reviews

J. A. SALZMANN, NEW YORK, N. Y.

Sectional Editors

CHARLES R. BAKER, Evanston, Ill.
HENRY D. COSSITT, Toledo, Ohio
JOSEPH D. EBY, New York, N. Y.
WILLIAM E. FLESHER, Oklahoma City, Okla.
HENRY F. HOFFMAN, Denver, Colo.
STEPHEN C. HOPKINS, Washington, D. C.
JAMES D. McCOY, Beverly Hills, Calif.
OREN A. OLIVER, Nashville, Tenn.

PUBLISHED BY THE C. V. MOSBY COMPANY, ST. LOUIS 3, U. S. A.

TABLE OF CONTENTS ON PAGE 2

Copyright 1954 by The C. V. Mosby Company

Vol. 40 DECEMBER, 1954 No. 12

FOR ENDURING ARCH RIGIDITY

Extra bearing surface: this is basic reason why Williams-Mershon Multi-Bearing Tubes and Posts give so much more stability to the lingual arch. Note the proportioning of the metal—sharp angles eliminated—a design which affords a firm locking of tube and post to prevent premature wear and looseness...Williams Multi-Bearing Tubes and Posts are precision made of hard gold-platinum precision alloys with special dies to insure perfect interchangeability of tubes and posts over a period of years. Priced same as ordinary tubes and posts. Post available in two types: continuous and partially severed lengths. Illustrated catalog on Williams Orthodontic Materials on request.

WILLIAMS GOLD REFINING CO., INC.

Fort Erie N., Ont. Buffalo 14, New York Havana, Cuba

WILLIAMS-MERSHON

TUBES & POSTS

(for lingual arches)

Vol. 40, No. 12, December, 1954. American Journal of Orthodontics is published monthly by The C. V. Mosby Company, 3207 Washington Blvd., St. Louis 3, Mo. Subscription price: United States and its possessions, $10.00; Canada, $10.25; Foreign, $11.00. Entered as Second-class matter, January 14, 1915, at the Post Office at St. Louis, Missouri, under the Act of March 3, 1879. Printed in the U. S. A.

American Journal
of
ORTHODONTICS
(All rights reserved)

VOL. 40 DECEMBER, 1954 NO. 12

Original Articles

TREATMENT OF IMPACTED CANINES

SAMUEL FASTLICHT, D.D.S., MEXICO CITY, MEXICO

THE maxillary canine, one of the strongest teeth in the human dentition and a very important esthetic and functional factor of the dental arch, for some unknown reason, can occasionally, remain in the depths of the tissues to a degree which makes normal eruption impossible. Its abnormal position has been determined since the advent of the x-ray.

Modern resources of both oral surgery and orthodontics can assure the liberation of this embedded tooth from the depths of the hard and soft tissues. The tooth can be guided safely into the line of occlusion and it can be made functional.

IMPACTION

The abnormality that occurs when a tooth has not erupted and is retained in the maxilla is called dental impaction, and the retained tooth, an impacted tooth. The impaction may be bony or submucous, unilateral or bilateral, and it may have reference to temporary, permanent, or supernumerary teeth.

We shall limit our study to impacted permanent canines, and in particular to those of the maxilla.

FORMATION AND EVOLUTION

According to the studies made by Logan and Kronfeld, slightly modified by McCall and Schour, and quoted by Salzmann,[1] the formation of the hard

Presented before the annual meeting of the American Association of Orthodontists in Dallas, Texas, April 26 to 30, 1953.

Read in part before: Cuarto Seminario Anual del Grupo de Estudios Dentales, U.S.C. Ciudad de México, Mayo, 1951, Mexico City; Primer Congreso Universitario Panamericano de Odontología, Mayo, 1952, Buenos Aires, Argentina.

tissues of the permanent canine begins between 4 and 5 months of age; the complete formation of the enamel takes place between 6 and 7 years; its eruption in the buccal cavity occurs from 11 to 12 years; and definite formation of the root is between 13 and 15 years of age. This chronological study of the human dentition is based on histologic cross sections. The upper canine does

Fig. 1.—Section of the maxilla of a 4½-year-old child. *a*, Permanent canine; *b*, first permanent premolar; *c*, gubernaculum for the first permanent premolar; *d*, first deciduous molar. (Courtesy of Dr. S. R. Atkinson.)

not have a definite area of development, as do the rest of the teeth. As for its position, at 12 months of age we find the crown of the permanent canine in process of calcification above the roots of the first deciduous molar, instead of being on top of the deciduous canine, as would be logical and as Dewel[2] indicates.

According to Atkinson,[3] at the age of 4½ years the developing canine is changing position above the first permanent premolar, and this, in turn, above the first deciduous molar; that is, three teeth, one on top of the other (Fig. 1).

The same author illustrates a section from a 5 ½-year-old maxilla which shows the crypts of the permanent canine, the central and lateral incisors, and the first and second premolars are all in contact at that age. It is readily understood, therefore, that during this period external pressure due to bad habits can displace the dental follicle (Fig. 2, *A* and *B*).

The calcification of the canine begins at almost the same time as that of the sixth year molar, although its definitive evolution is later; that is, it takes twice as long to appear in the oral cavity. The canine, because of its long migration, is more exposed than other teeth to unfavorable influences over a period of several years.

The congenital absence of the canines has seldom been observed and rarely are they found as supernumerary teeth. We have found only one such case, which has been the subject of a previous publication.[4]

This, next to the mandibular third molar, is also the tooth which reveals the greatest percentage of anomalies of position.

SEX

According to statistics presented by Salzmann, the eruption of the permanent teeth occurs at an earlier date in girls than in boys. Impacted canines are found in both sexes, but with greater prevalence of anomalies in girls, according to studies made by Blum[5] and Rohrer.[6] Theodor Blum made a study from which he concludes that, of a total of 190 upper malposed teeth, 99 were canines. Later, Alfred Rohrer, in his radiographic research, "Displaced and Impacted Canines," observed the following in 3,000 cases:

1. Females present more cases of impacted canines than males, and with greater frequency on the left side.
2. Impacted canines are twenty times more common in the maxilla than in the mandible.
3. The palatine evolution of the canines is three times greater than the labial.

Rohrer explains that "the cranium of the female is smaller than that of the male, with consequent diminution of the face."

ETIOLOGICAL FACTORS

Among those factors which may cause impaction of the canine, the most common are: supernumerary teeth, leaning habits, dentigerous cysts, prolonged retention of deciduous canines with septic root canals, or the premature extraction of deciduous canines and molars.

The reduction of space produced by the premature extraction of the first deciduous molar causes the permanent premolar to be displaced to a forward position, consequently reducing the area belonging to the canine, which, in turn, may be thus deviated toward the labial or the palatine region.

As in the case of the other malformations, heredity also plays a very important role.

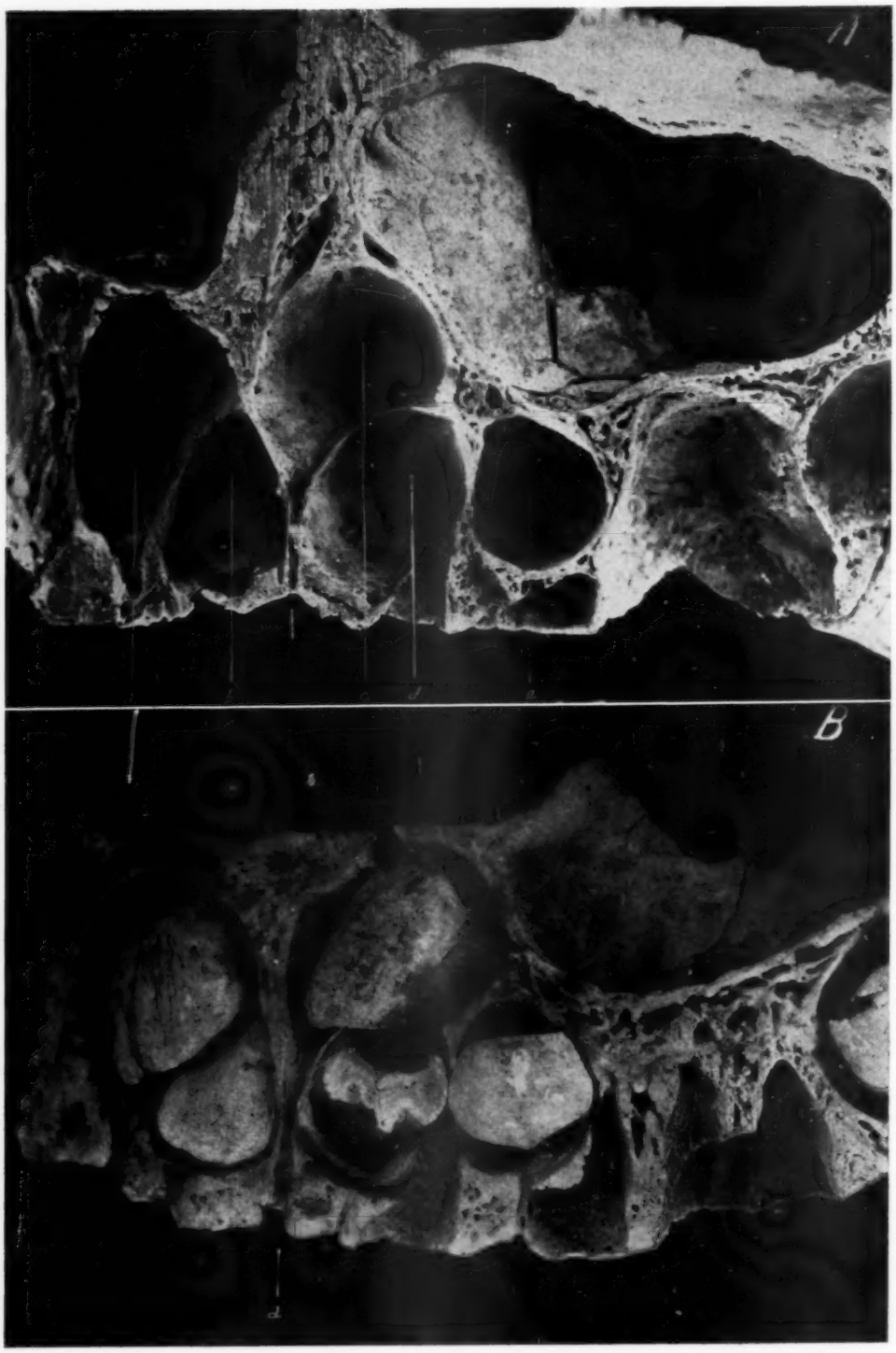


Fig. 2.—*A*, Section of maxilla aged 5½ years, showing the crypts in close contact (external plate removed): *a*, Permanent central incisor; *b*, permanent lateral incisor; *c*, permanent canine; *d*, permanent first premolar. *B*, Maxilla with teeth in place in 5½-year-old child. *a*, Gubernaculum for the permanent canine. (Courtesy of Dr. S. R. Atkinson.)

In order to avoid a discussion of uncertain factors or those with insufficient clinical proof, we shall not include the numerous references in which mention is made, among other things, of endocrine disorders, causing delayed dentition, as well as tooth retention.

Deficient mastication in our times undoubtedly has an influence on the lack of development of the maxillae.

Hunter,[7] in his classical work of the eighteenth century, makes note of the fact that among the most frequent irregularities of the teeth are those of the "cuspidati, because they are often formed later than the bicuspedes; in consequence of which the whole space is taken up before their appearance."

We have observed maxillae with well-developed arches without finding any of the foregoing factors. Nevertheless, we often find a canine or canines in an almost horizontal position, all of which makes us think that the etiological picture is not clear and that some unknown cause exerts an influence on the displacement of the dental follicle.

PSEUDOPROGNATHISM

Another of the definitive causes of impaction of the upper canines is the anomaly characterized by apparent mandibular prognathism (false prognathism), which in reality pertains to Class I, according to Angle's classification. In such cases the upper front teeth are in intraocclusion, which causes a lack of development of the anterior region of the maxilla.

If the condition just described does not receive early attention, this lack of development may result in the compression of the maxilla in the area of the canines which, for lack of space, ultimately may be retained and impacted.

Early orthodontic treatment can stimulate the growth of the maxilla by expanding this region and an inclined plane constructed by an acrylic splint over the lower teeth, making the upper front teeth slide over and forward. In this particular case, intervention is urgently indicated between the ages of 7 and 10 years.

LITERATURE

On briefly examining the literature related to dental impactions, we have not been successful in finding a satisfactory explanation for the horizontal position of the canines.

Rafael Huneeus,[8] in his erudite and comprehensive study on impacted teeth and their orthodontic treatment, confesses that he has not been able to "establish the causes which determine them," and Dewel,[2] in his recent publication (a very judicious paper), in speaking of the etiology of the so relatively common palatine impaction, can do no more than conclude that the "etiology is obscure."

Hunter prudently observed that all the spaces are already occupied when the canine makes its appearance.

Calvin Case,[9] another of the great masters of orthodontics, in the chapter on "Impacted Teeth and their Treatment," states that "the common cause of

dental impactions is the absence of room in the arch for their free and normal eruption." I would like to emphasize that all the authors are in agreement that one of the principal causes of canine impactions is the lack of space.

CLINICAL SYMPTOMS, SIGNS, AND COMPLICATIONS

In many instances, the abnormal position of the impacted canines displaces the lateral incisor from its normal position; in others it produces a marked rotation, thereby causing alarm, which constitutes the first symptom noted by those who have contact with the patient.

Fig. 3.

Fig. 4.

Fig. 3.—Impacted canine producing root resorption of the central incisor in a boy 12 years old.

Fig. 4.—Pericoronary cyst of the impacted canine; lateral incisor lost by complete root resorption. The patient is an adult 25 years old.

On visiting the dentist, the parents do not realize that the canine observed in the arch is not the permanent one, but the deciduous one, and only an x-ray picture convinces them that it is a question of an impacted permanent canine whose time of eruption has passed.

When the deciduous canine has been lost and the impaction of the permanent canine is unilateral, the proximal contacts are missing and the deviation from the midline is very obvious from the esthetic point of view.

The disorders occasioned by an impacted canine are numerous, but undoubtedly the most serious is the resorption of the root of the lateral or central incisor (Fig. 3). We have observed several cases in which the pressure of the canine has caused the resorption of a large portion of the root of the neighboring lateral or central incisor. This resorption usually takes place without pain.

According to Kronfeld,[10] an impacted canine can cause pain of a neuralgic type. Huneeus also believes that dental impactions are accompanied at times by severe neuralgias as a consequence of the compression or irritation of the nerve.

It is well known also that impacted teeth have a tendency to form pericoronary cysts, a pathologic condition relatively common in all impactions (Fig. 4).

ROENTGENOGRAPHY

Roentgenography is of primary importance for the diagnosis of the impacted teeth and for their accurate localization. The customary intraoral x-ray films are not sufficient to determine the location, since the canine may be found in either the labial or the palatine region. The occlusal roentgenograms are essential for surgical intervention.

At times several x-ray pictures are required for the purpose of localizing the position of the embedded canine with precision and, even then, difficulties are encountered when the canine is situated at the level of the apex on the border line between the labial and palatine walls. The abnormal position may be from almost vertical to completely horizontal, the latter position being the one that causes the greatest disorders and also the most difficult to correct. The prognosis is favorable when the diagnosis is early and adequate treatment is initiated.

Once the diagnosis has been made, obvious causes of the impaction, such as supernumerary teeth, cysts, odontomas, and infected deciduous teeth, must be eliminated.

TIME FOR TREATMENT

Initiation of treatment at about 12 years, or earlier if possible, favors the eruption of the impacted canine, and is sided by the natural forces of growth. However, patients of more advanced ages, even 25 and older, have been treated with favorable results. Without treatment, the persistence of the impaction often presents complications characteristic of all teeth that are abnormally retained or embedded in the tissues.

The palatine region, where the impacted canine is generally found, is considered resistant, as the structure of the hard tissues and of the palatine mucosa is excessively thick. It is logical to assume that such marked resistance of the dense tissues which the canine has to travel might be the cause of the frequent impaction of the same, especially in view of the distance which the tooth must migrate and the considerable length of time required for this crossing.

SURGERY

As previously stated, the object of surgical intervention is to liberate the impacted tooth and to guide it later, by means of orthodontic appliances, to its correct position in the dental arch.

After anesthetizing the area where the operation is to take place (local anesthesia is sufficient), the impacted tooth is surgically exposed by removing

the overlying mucosa and bone around the crown of the canine, if it is covered. It is not considered good practice to uncover large areas, as the oral surgeon customarily does, because this often exposes the roots of the neighboring teeth, with unwanted consequences. The borders of the mucosa are cauterized

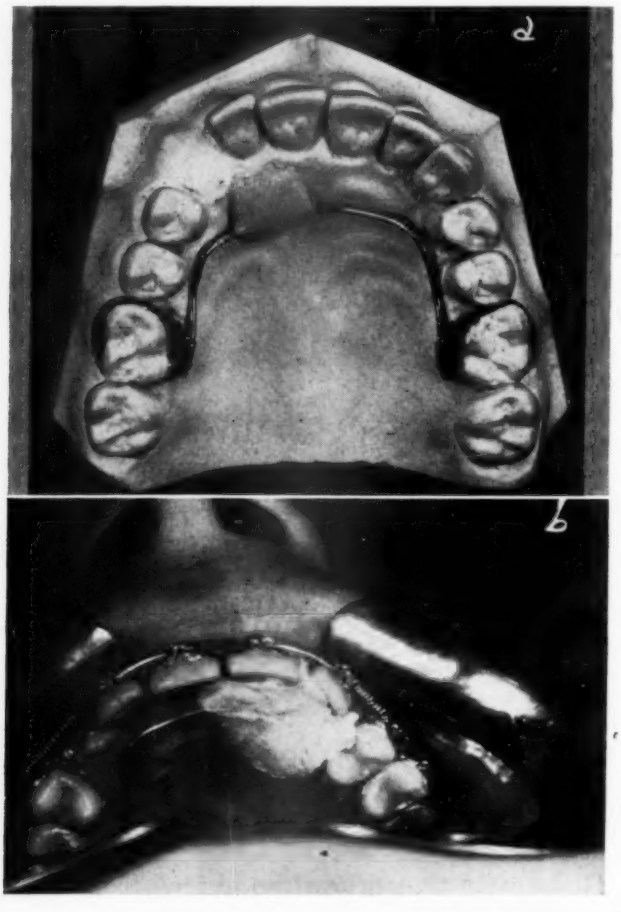


Fig. 5.—*a*, Wonderpack in place covering exposed canine, attached to lingual arch of 0.36 round wire, with horizontal lug of chrome alloy; *b*, Wonderpack dressing placed over a lingually exposed canine.

with electrocautery. In this way, two objectives are achieved: hemorrhage is combated, and new tissue is prevented from covering the already exposed tooth.

Wonderpack is attached to a lingual or labial arch to protect the wound. The Wonderpack is a medicinal cement, well-known to oral surgeons, and particularly to those who formerly enthusiastically followed Dr. Ward's technique in the surgical treatment of pyorrhea. The properties of this surgical cement are triple: hemostatic, analgesic, and antiseptic. The addition of tannic acid to the mixture will increase the hemostatic action and make the packing more firm.

Prior to surgical intervention, a lingual arch is constructed, using the first permanent molars as anchorage and to stabilize these teeth later. In this

phase of the treatment, the arch will serve basically to retain the Wonderpack for a period of ten to fourteen days, with the purpose of protecting the operated area and preventing the newly formed tissue from covering the exposed tooth.

The Wonderpack dressing, thickly mixed, is placed over the wound of the recently exposed tooth and attached to the lingual arch which crosses the operative field and keeps the Wonderpack in place (Fig. 5). The same procedure can be applied to the labial arch, if the impacted tooth is localized in the labial region. It cannot be overemphasized that, with the use of Wonderpack, there is absolutely no postoperative pain.

During the first few days after the operation, hard foods should be avoided, and if a part or all of the dressing should fall out it should be replaced immediately. If it lasts the first week, which is very often the case, then the exposed wound is free from complications and discomfort.

Fig. 6.—Impression of exposed tooth segment with copper band and compound.

Once surgical treatment has been concluded, Nature will take care of the rest; that is, the eruption of the canine will take place after the obstacles have been eliminated.

GOLD CAP

After several weeks have passed, an impression of the tooth or tooth segment which appears is taken with a copper band and compound, and the model constructed in copper amalgam or in stone. An impression of the entire cusp of the crown is not always possible, particularly when the impacted tooth is in a horizontal position (Fig. 6). Even then, a partial impression will be enough, taken with the heated end of a compound stick. In spite of the reduced areas, this small cast cap will be effective for traction, once cemented. A loop, staple, or bracket is molded to the wax cap, according to the place, direction, and position of the semi-impacted tooth and the traction which is desired (Fig. 7). Once the small cap has been cemented, it is very effective

and will rarely fall off because adhesion to the tooth is so firm that it often is necessary to cut it when it does not yield to the pressure of an instrument at the time of substituting the cap for a regular orthodontic band.

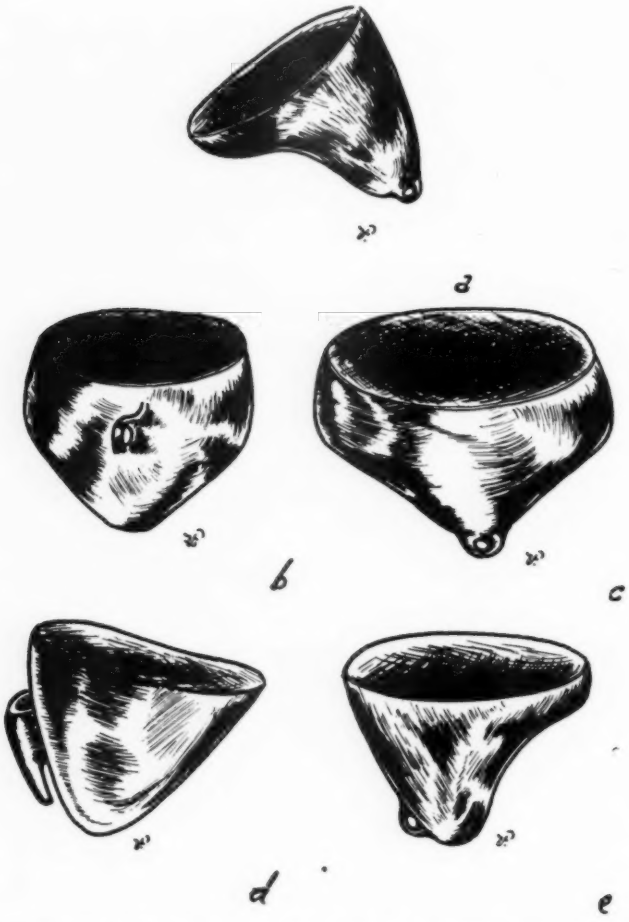


Fig. 7.—Various gold caps used for traction on semi-impacted canines.

It is advisable to move the capped canine from the palatinal to the labial region when it is still short and when it will not interfere with the lower teeth. It should later be brought down, having once crossed over the lower teeth and reaching the normal alignment in the upper arch.

The procedure used for years by both American and European orthodontists, of employing a pin or small hook drilled and cemented in the edge of the exposed tooth, is not advised. This procedure is illustrated by photographs and roentgenograms in the orthodontic literature. As may be readily understood, the drilling and pin technique has a very serious disadvantage because of the possibility of causing an injury to the pulp chamber on perforating a tooth in which the pulp occupies a great part, since the treatment is generally done in adolescent individuals. Moreover, because of the uncertain

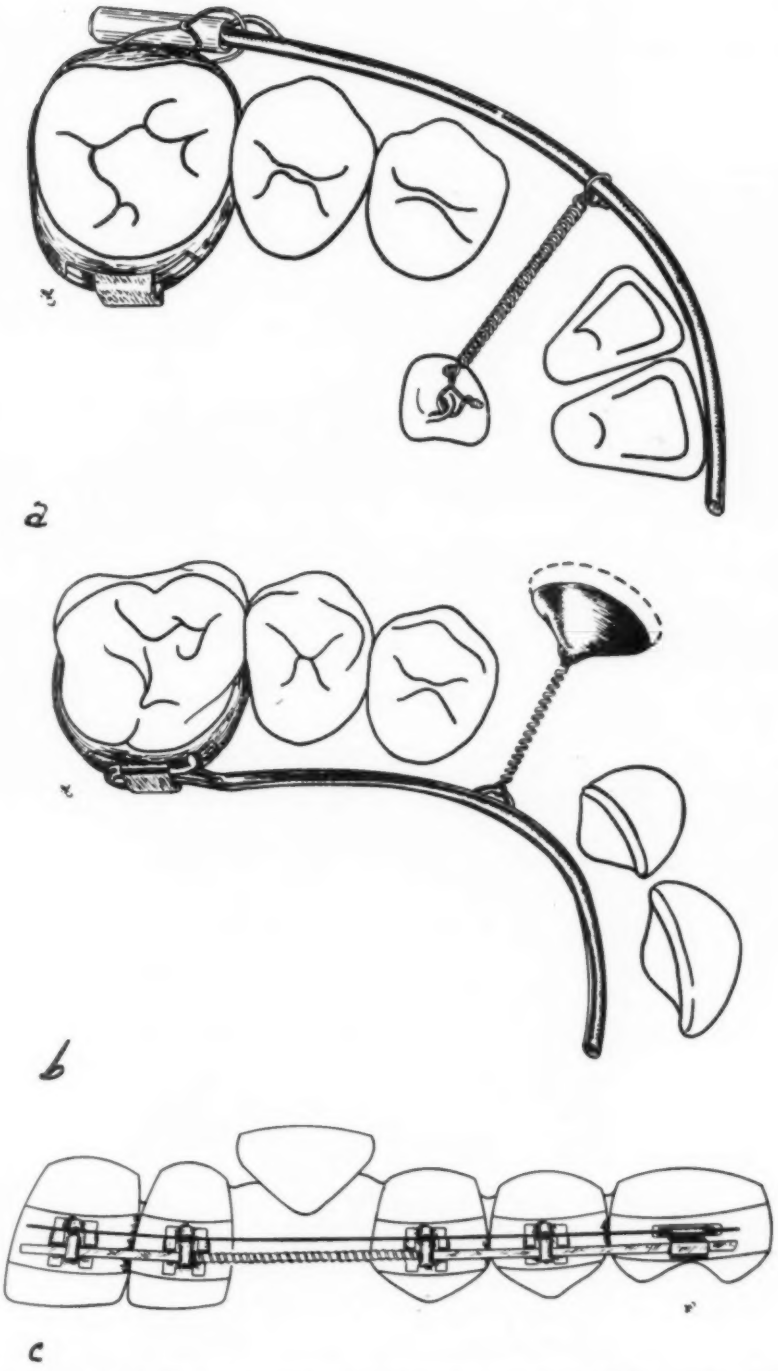


Fig. 8.—*a*, Metal coil spring making traction from capped canine toward round labial arch; *b*, labially semi-impacted canine with traction toward lingual arch; *c*, coil spring on labial arch making space for canine.

Fig. 9.—*a*, Front view showing decidous canine and permanent lateral incisor in torsion; *b*, x-ray demonstrating impacted permanent canine; *c*, canine under traction. The patient is a 15-year-old girl.

position of the impacted canine, the enamel of the labial surface may be mutilated, especially if one takes into consideration conditions under which the operator sometimes must work. On the other hand, the small cap which we use has the advantage of security.

Fig. 10.—*a*, Deciduous canine in place and x-ray showing impacted permanent canine; *b*, permanent canine after treatment and x-ray of the same in a 14-year-old girl.

ORTHODONTIC TECHNIQUE

In regard to the construction of the lingual arch which will support the Wonderpack, the probable position of the canine or canines to be exposed should be considered so that the lingual arch may not interfere with the uncovered tooth and should in no way obstruct or impede its eruption. If it does, a new lingual arch should be constructed later, once the tooth starts erupting. For the purpose of guiding the tooth from the palatine region to the lingual, a metal coil spring is employed making traction on the cap toward the labial arch. This is constructed also in chrome alloy of 0.36 inch round wire and is fastened to the round tubes welded to the bands of the sixth year molars. The same traction is made toward the lingual arch if the impacted canine is located in the labial region (Fig. 8).

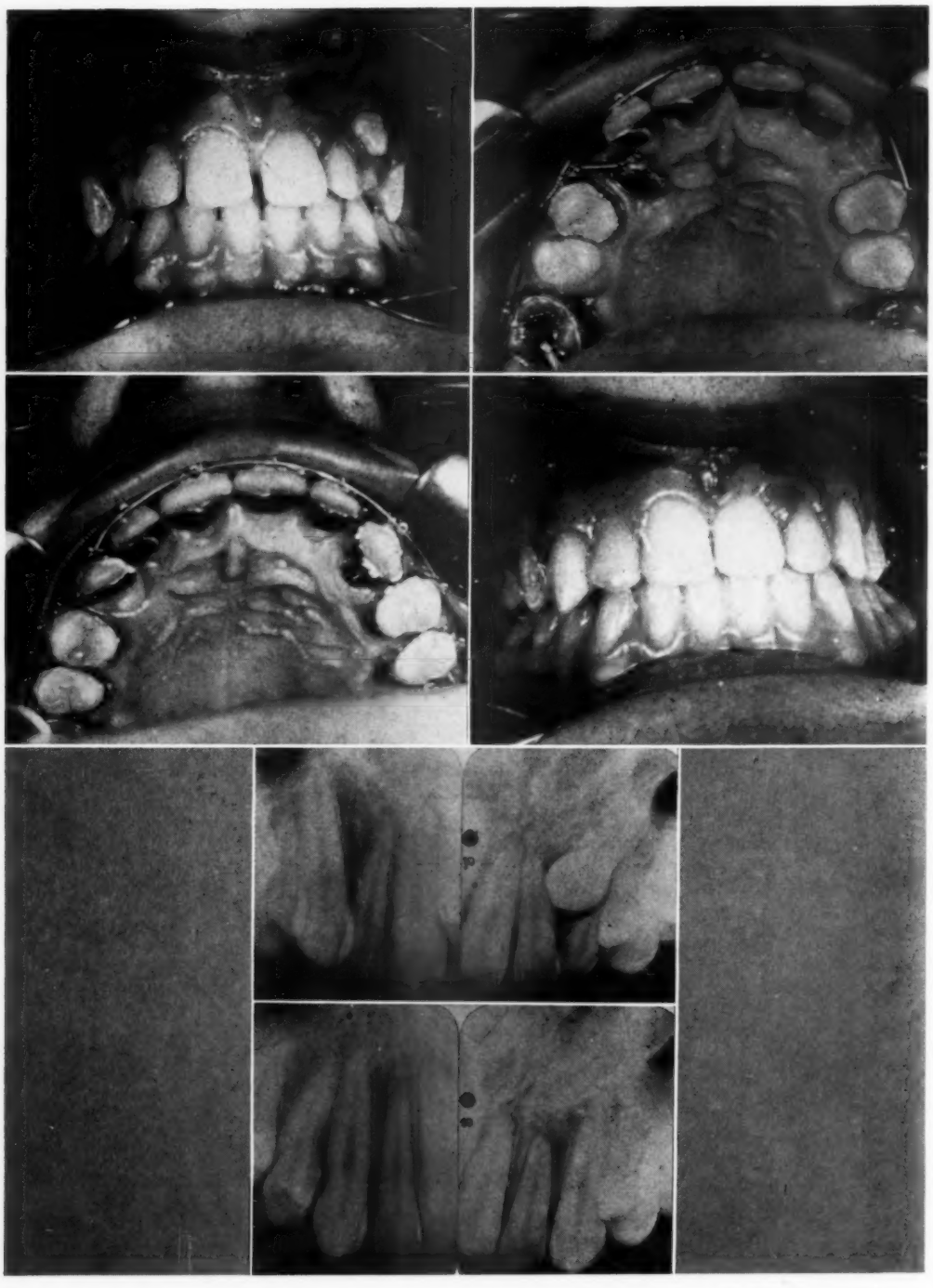


Fig. 11.—Impacted right upper permanent canine, before, during, and after treatment and x-rays of the same, in a boy 14 years of age.

Experience has taught us not to depend completely upon children when their cooperation is required. Therefore, metal coil springs are used for traction, avoiding the use of rubber bands when possible (Figs. 9, 10, and 11). It is very common not to find sufficient space in which to guide the exposed canine. In this phase of the treatment the standard orthodontic procedure should be instituted.

If the age permits and the case so requires, the expansion of the maxilla affords the necessary space but, when the patient is an adult, in whom the expansion is contraindicated, extraction of the first premolar solves the problem of space and saves time in treatment.

Obviously, one should not attempt to force a canine into a space in which it simply does not fit. That excessive pressure, prolonged by means of appliances, often can cause the resorption of the roots of the neighboring teeth, particularly of the lateral incisor.

The procedure of extraction is not an innovation. As early as 1888, Farrar[11] affirmed that maxillae which do "not require widening can generally be best aided by extracting some tooth (on one or both sides of the arch), posterior to the cuspid."

SUMMARY

A technique for the treatment of impacted canines has been described. It does not pretend to be new or original. It adds to the surgical procedure, the use of Wonderpack, retained by a lingual or labial arch. The Wonderpack protects the wound about the exposed tooth. A small cast gold cap is cemented to the exposed tooth and traction is made by coil springs.

I would like to thank my associate, Dr. Margarita Correa, for her clinical help, and Dr. David Glusker of Mexico City, and Dr. Spencer R. Atkinson of Pasadena, California, for their assistance in the preparation of this paper.

REFERENCES

1. Salzmann, J. A.: Principles of Orthodontics, ed. 2, Philadelphia, 1950, J. B. Lippincott Company, p. 221.
2. Dewel, B. F.: The Upper Cuspid, Its Development and Impaction, Angle Orthodontist **19**: 79-90, 1949.
3. Atkinson, Spencer R.: Some Anatomic Factors Guiding Treatment Therapy, AM. J. ORTHODONTICS **28**: 704-720, 1942.
4. Fastlicht, Samuel: Supernumerary Teeth and Malocclusion, AM. J. ORTHODONTICS AND ORAL SURG. **29**: 637, 1943.
5. Blum, Theodor: Malposed Teeth: Their Classification, Pathology and Treatment, INT. J. ORTHODONTIA **9**: 122-137, 1923.
6. Rohrer, Alfred: Displaced and Impacted Canines, INT. J. ORTHODONTIA **15**: 1003-1020, 1929.
7. Hunter, John: The Natural History of the Human Teeth, London, 1778, J. Johnson, p. 73.
8. Huneeus, Rafael: Los dientes incluídos y su Tratamiento, Santiago de Chile, Impaenta "Yungay," p. 122, 1938.
9. Case, Calvin S.: Dental Orthopedia, Chicago, 1908, C. S. Case Company, p. 247.
10. Kronfeld, Rudolf: Histopathology of the Teeth, ed. 2, Philadelphia, 1939, Lea & Febiger, p. 413.
11. Farrar, John N.: Irregularities of the Teeth and Their Correction, Vol. II, London, New York, Leipsic, 1888-1897, The International News Company, p. 1028.

LONDRES # 85

SERIAL EXTRACTION IN ORTHODONTICS: INDICATIONS, OBJECTIVES, AND TREATMENT PROCEDURES

B. F. Dewel, D.D.S., Evanston, Ill.

INTERCEPTING certain forms of malocclusion with a preliminary program of serial extraction has a legitimate place in orthodontics, provided the indications are correct and the postextraction shifting is controlled by mechanical means. The procedure is relatively new and highly controversial. Many cases that appear hopeless when first examined can be treated, of course, with reasonable success without extraction. The orthodontic responsibility is to differentiate between those cases which will respond to ideal treatment and those which must submit in the beginning to compromise measures, if relapse and a time-consuming second period of treatment with extraction are to be avoided.

Serial extraction is based on the premise that in certain types of cases the orthodontist is confronted with a continuing discrepancy between total tooth material and deficient arch length. He is presented with a limited amount of basal bone, present or potential, in which to reposition rotated, malposed, or blocked-out teeth. Any effort to enlarge that base to accommodate all the teeth far too often is rewarded with relapse and failure. Even the most efficient mechanical aids do not create new bone growth beyond the alveolar process, and sometimes they fail to do so in that structure. There is no other choice—normal occlusion must be supported by adequate and normal basal bone.[1]

This discussion will be limited to those conditions that show so little promise of potential development that an early decision should be made on some form of compromise treatment. No one questions that the orthodontist's primary responsibility is to guide and encourage growth in a favorable direction, but he also must be the first to recognize in the early stages, structural deficiencies that have little or no hope of responding to ideal treatment procedures.

Cases which fall into this group are characterized by shortened arches, blocked-out or malposed incisors, a shift in the median line, and frequently early loss of one or both of the mandibular deciduous cuspids. Facial contours and dental appearance are still acceptable; esthetics has not yet become a problem. The molars usually retain a Class I relation. In these cases the maxillary and mandibular incisors are vertical, over apical base, and present

Read before the Chicago Dental Society, Feb. 8, 1954.
From the Department of Orthodontics, Northwestern University Dental School.

a reasonably normal overjet and overbite. Other cases may be protrusive with poor skeletal patterns and disturbed facial musculature, and still others are potential Class II malocclusions.

The cases to be illustrated fall into this general description. The average age when placed under observation was 7 years. All of them have been, or are presently, under the following treatment plan: (1) a preliminary observation period with study models, photographs, radiograms, and case history; (2) a mandibular lingual supporting arch when indicated; (3) progress models, radiograms, and photographs at regular intervals; (4) serial extraction in the proper sequence and at the proper time of the deciduous cuspids, the deciduous first molars, and finally the first premolars; and (5) ultimately a reasonably short period of active treatment with the edgewise appliance.

The advantages of this procedure are several. Growth once lost cannot be regained,[2] but delayed treatment with periodic observation enables the orthodontist to determine developmental trends which, if favorable, provide the necessary diagnostic information to return to standard ideal treatment methods when indicated. By judicious serial extraction in cases with an unfavorable outlook, eruption of the remaining permanent teeth in a desirable direction is encouraged and the severity of individual tooth malpositions is reduced.[3] This in turn eliminates excessive stress on dental anchorage units and shortens the period of active treatment for cases that fall in this category. It also reduces the necessity for prolonged retention and often eliminates it entirely.

DEVELOPMENTAL PATTERNS WITH AND WITHOUT INTERCEPTION

As an introduction to the problems of serial extraction, two cases of a reasonably similar nature are illustrated. In the first, recommendations for extraction of teeth were not followed because of a natural reluctance of the patient's parents to the procedure. The second patient presented identical conditions for all practical purposes, and the timing was correct in the extraction program.

The right intraoral photograph of the first patient at the age of 11 illustrates a Class I malocclusion as it existed on Aug. 31, 1949 (Fig. 1). Spaces for the right cuspids have been reduced to but a few millimeters. The maxillary cuspid is unerupted, and the mandibular cuspid has emerged to the buccal and labial.

The left side shows completely blocked-out and unerupted cuspids and the presence of the only remaining deciduous tooth, the maxillary left deciduous first molar. Only 2 mm. of space is available for the mandibular left cuspid. It is less in the maxillary arch.

Since recommendations for an extraction program were not accepted, no treatment of any kind was undertaken. Subsequent intraoral photographs secured on March 31, 1952, illustrate the complications that developed during the intervening nineteen months. Three of the cuspids erupted in positions

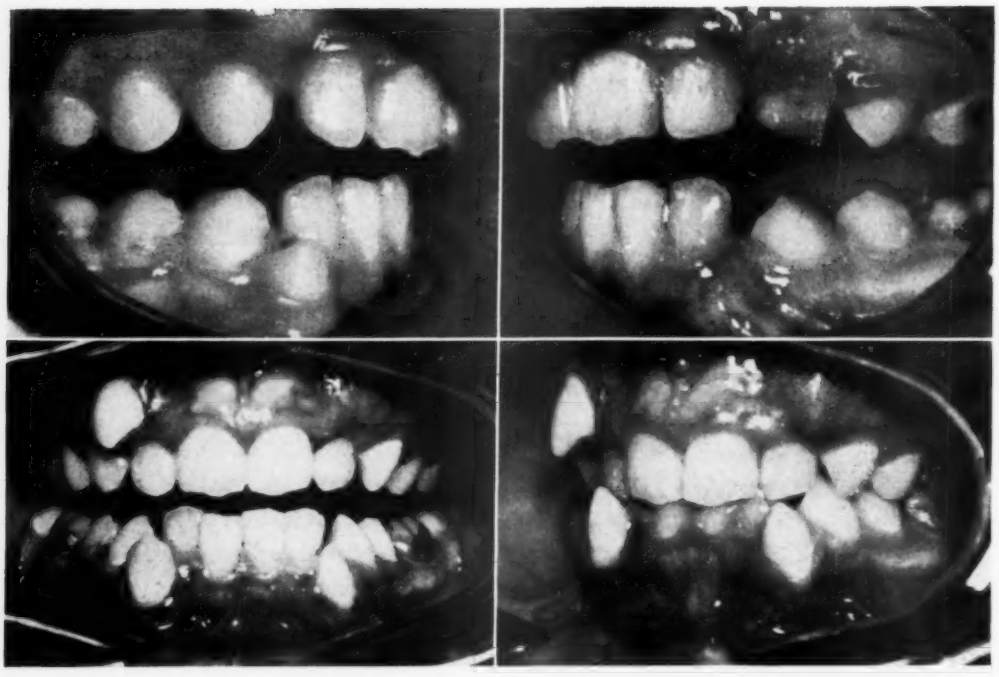


Fig. 1.—This is the first of two similar cases to illustrate developmental patterns with and without interception by serial extraction. In this case, recommendations for the removal of teeth were not accepted until after the eruption of the cuspids. In the meantime, the cuspids erupted completely to the labial of normal arch alignment. Compare with Fig. 3.

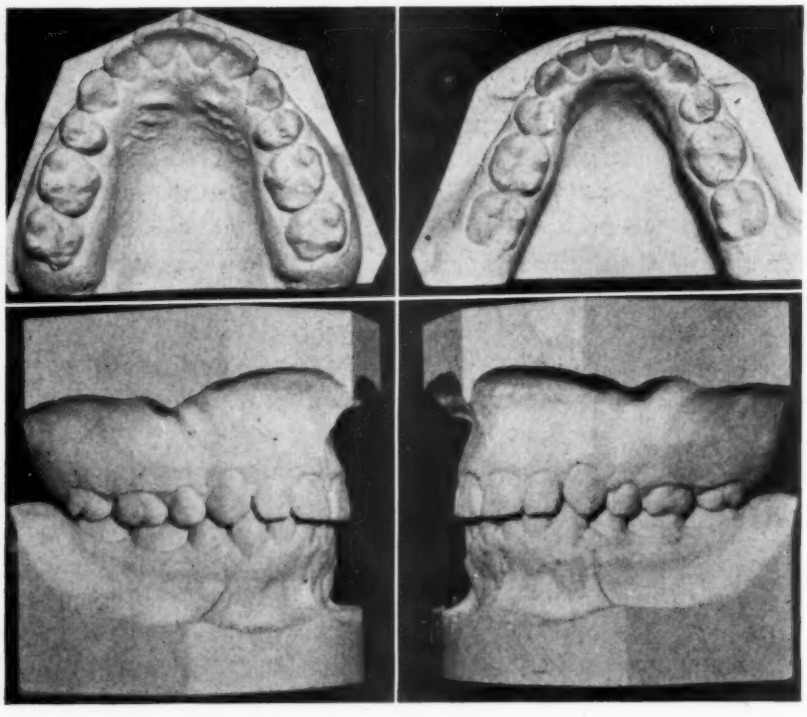


Fig. 2.—Final results of case shown in Fig. 1. Delay in extraction increased treatment time and anchorage problems in correcting cuspid positions. Earlier extraction would have permitted the cuspids to drift distally during eruption, as in the similar case shown in Fig. 3.

of extreme labial malposition. The fourth, the maxillary left cuspid, was about to erupt in a similar position. In the meantime, any remaining space for these teeth had been eliminated.

The indicated treatment still remained the extraction of the four first premolars, but now the case was much more severe. Had these teeth been extracted when the patient was first observed, the eruption of the four cuspids

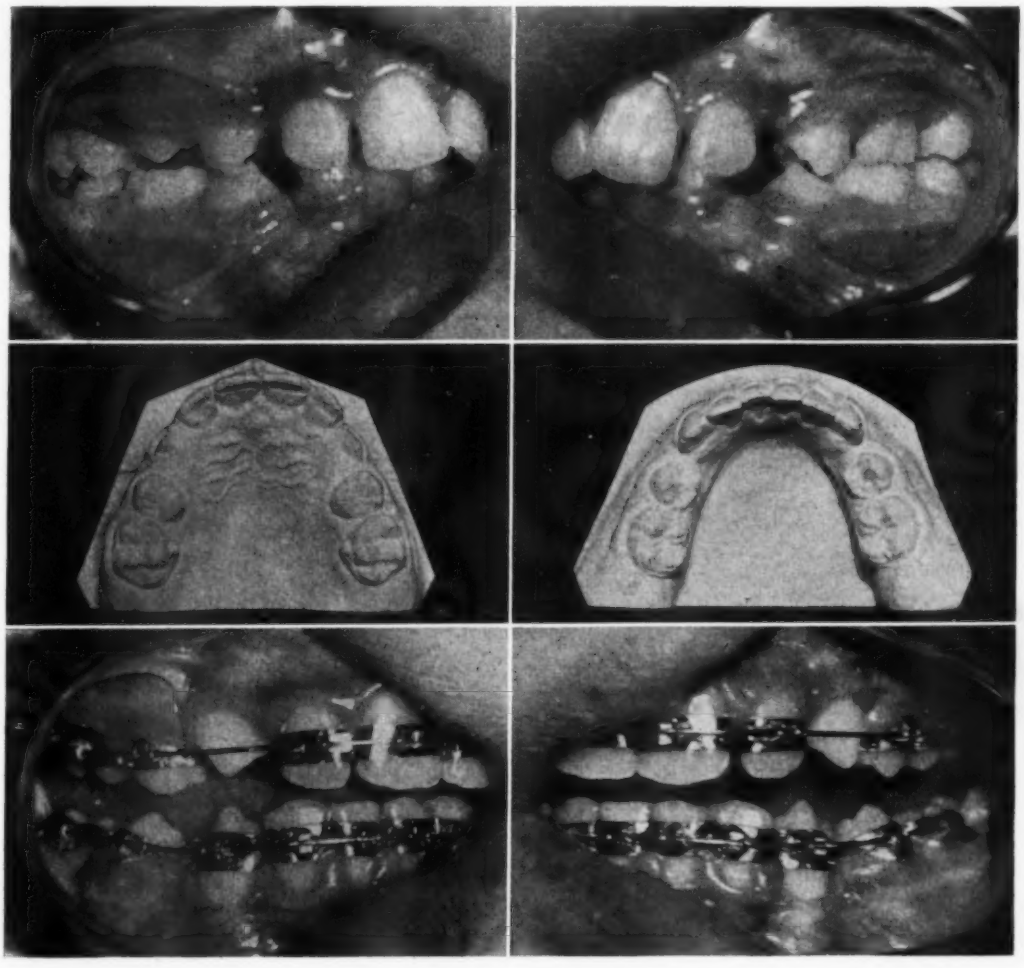


Fig. 3.—Cuspid space reduction is similar to the case illustrated in Fig. 1. Prompt extraction of the first premolars permitted favorable eruption of the cuspids in this case. The models were secured at the time the appliances were being placed. No supplemental lingual appliances were necessary to reinforce anchorage units as in the first case.

would have been in a more favorable direction into the spaces formerly occupied by the first premolars. Nineteen months later distinct anchorage problems and a much longer period of treatment were involved in repositioning these labially displaced cuspids distally to normal alignment in the dental arches.

Models secured on Dec. 22, 1953, illustrate the final correction with the edgewise appliance following twenty months of active treatment (Fig. 2).

Occlusal relations and arch form are acceptable, but the anterior teeth appear to be displaced slightly to the labial. This occurred in spite of the fact that a mandibular lingual supporting arch wire and a maxillary acrylic stabilizing plate were utilized to reinforce anchorage while the cuspids were being moved distally. Had the premolars been extracted when first recommended, these supplemental appliances could have been eliminated and the incisors could have been maintained immediately above basal bone. Prolonged retention is now required. It will be several years before permanence of results can be determined with accuracy.

The second case presented remarkably similar conditions in another patient of 10 years, 3 months (Fig. 3). The right intraoral photograph shows the slightly earlier dental age, since this patient had no cuspid in eruption and still retained a mandibular second deciduous molar on this side. First premolar position and reduction of cuspid space were virtually identical with that of the first patient, although in this case inadequate vertical development was apparent from the beginning.

A similar condition existed on the left side. Both second deciduous molars were present, but the space for the cuspids was slightly larger than was observed in the first case. Permanent cuspid positions can be determined in this illustration by the canine eminences gingivally to the spaces between the lateral incisors and first premolars. It takes but little imagination to predict that, on eruption, these cuspids will present distinct labial malpositions just as they did with the first patient in the absence of orthodontic interception.

In this case, however, extraction of the four first premolars was accomplished immediately after the intraoral photographs were taken on Oct. 13, 1952. Subsequent eruption of the maxillary cuspids was unusually favorable, as may be observed in the occlusal view of the maxillary model secured one year later on Oct. 16, 1953, at the time active treatment was being undertaken. The mandibular model also shows reasonably acceptable cuspid eruption. Although these mandibular cuspids emerged with a moderate distal inclination, arch form from the occlusal aspect is far more favorable than in the previous case.

The patient is now being treated with the edgewise appliance. Supplemental lingual appliances are not necessary; there is no anchorage problem such as was encountered in the first case. Treatment will proceed more quickly and with fewer complications for both patient and orthodontist. A much more stable result can be anticipated on completion than would have been possible had this condition been permitted to develop into a fully matured malocclusion, as it did in the first case.

ORTHODONTIC RESPONSIBILITY IN SERIAL EXTRACTION

Examination of these two cases provides the basis for a study of the indications and objectives of serial extraction in orthodontics. No one today questions the advisability of extraction of first premolars in complicated malocclusions as developed by the first patient. In the second case, the advantages of intercepting extreme cuspid malpositions by a planned program of serial

extraction are apparent. The orthodontic responsibility is that of analysis and interpretation of the deeper supporting structures to determine which cases will respond to ideal treatment and which should submit in the beginning to an extraction compromise.[4]

A word of caution is necessary at this point: serial extraction is indicated only in a limited minority of patients who present for treatment. It very definitely is not a procedure to be undertaken without a most thorough case analysis, including study models, intraoral radiograms, photographs, and a complete history of the patient. Cephalometric records are of great value in confirming clinical conclusions. No single diagnostic aid is sufficient—all must be recorded. Every effort must be made to determine whether the condition can be corrected with a full complement of teeth. No teeth should be extracted without first observing the patient for several months in the hope that a favorable growth trend can be discovered. If none is observed and an extraction program is undertaken, timing is of the greatest importance. These children should be examined frequently, and the method of treatment must be determined independently and accurately for each individual patient. Complete new records should be secured at each step, and the sequence of extraction followed in an orderly manner.

The question in these cases of retarded development is: Where can we get the necessary space if we do not extract? On the one hand, we are told that growth of the anterior portion of the mandible ceases for all practical purposes after about six years and, on the other, that effective simultaneous distal movement of maxillary and mandibular buccal segments is an illusion. Expansion of teeth labially or buccally off apical base is not the answer; ultimate relapse with protrusion and crowding of incisors is seen clinically far too often with this procedure. One form of malocclusion has simply been substituted for another.

RESEARCH INVESTIGATIONS ON DEVELOPMENTAL AREAS

Growth studies by research investigators tend to verify clinical observations on the developmental limitations of the supporting structures of the teeth, particularly in these conditions of retarded development. The first recorded study on facial growth was that of John Hunter in 1771.[5] Much of what he said has not as yet been contradicted. For the purpose of this article, his most pertinent conclusion was that:

> The jaw still increases in all points till twelve months after birth, when the bodies of all the six teeth (from the deciduous central incisor to the first permanent molar) are pretty well formed; but it never after increases in length between the symphysis and the sixth tooth. . . . After this time the jaws lengthen only at their posterior ends.

Hunter's work was among the first of a long series of scientific investigations based on vital staining methods. The earliest observation was that madder root fed to animals produced a redness of their bones, and that only that part of a bone that was growing assimilated the color. Recent research has been with alizarin red S, a dye derived from the madder root which

produces the same reaction when injected into young monkeys. One of the most recent investigations was undertaken by Massler,[6] who observed that the mandible in very young monkeys was found to be heavily stained on all surfaces. In this manner it was demonstrated that growth occurs throughout at a rapid rate during early mandibular development.

Brodie's[7] conclusions regarding growth in older animals were of equal significance when related to conditions of retarded development that appear to call for serial extraction procedures. For these he reports:

> The animal which corresponds to a six-year human dental pattern is quite different. The generalized type of growth has nearly disappeared, bringing into strong relief certain "sites" of growth. The most apparent of these is located at the head of the condyle where the red staining is intense. Another zone of deposition is present along the entire length of the posterior border of the ramus, the sigmoid notch and along the alveolar crest. Deposition on the inferior border seems to have stopped and only faint traces are noticeable on the lateral surfaces. . . . It is thus seen that the principal directions of growth in the mandible are upward at the alveolar process, backward at the ramus, and upward and backward at the condyle.

This creates the illusion that growth is occurring throughout the mandible. More correctly, the mandible is being thrust downward and forward by upward and backward growth of the condyle against a relatively constant cranial base. Any possible further growth in this base would also tend to be in a downward and forward direction. Thus, the mandible is changing position, but no actual increase in mandibular growth mesial to the first permanent molar can be demonstrated. Anteroposterior growth in the mixed dentition depends primarily on resorption of bone on the anterior border of the ramus and deposition of bone on the posterior border of the ramus. It is in this manner that sufficient mesiodistal arch length is gained for the subsequent eruption of the permanent molars in the posterior sections of the mandibular arch. A somewhat similar developmental pattern to increase arch length in a posterior direction exists also in the maxilla.[8]

From these research investigations, it is reasonable to conclude that once appositional growth has been completed in the area mesial to the first permanent molar, it cannot be reactivated to create new bone growth. There is, moreover, no possibility of internal expansion of the mandibular supporting structures by what has been called "interstitial growth of bone." Sicher[9] is the authority for the statement that "bone tissue grows only by apposition. Interstitial growth of bone does not exist, and this statement is unqualified and unequivocal. . . . In interstitial growth of a tissue, cells inside a block of tissue multiply by division and produce more of the intercellular substance, and this tissue grows by expansion from within. . . . Hard tissue, bone, cementum, dentine, cannot possibly grow by expansion. These tissues grow by apposition, new layers being laid down on old layers."

CLINICAL ANALYSIS OF ARCH DEFICIENCIES

In a clinical approach to this problem of arch length and developmental areas, Nance[10] demonstrated that this same difficulty in creating bone growth

mesial to the first permanent molar exists in the alveolar arch as well as in the deeper supporting structures. From comparative measurements of individual teeth, he observed that the total mesiodistal widths of the mandibular deciduous cuspid and molars on one side average 1.7 mm. greater than the total widths of their permanent successors. In the maxillary arch the difference is 0.9 mm. Nance termed this the "leeway" space. But this space is not available for the repositioning of crowded incisors or for opening up deficient cuspid spaces. It is, instead, required by the first permanent molars for their normal forward movement during the transition from the mixed to the permanent dentition—in particular, on the loss of the second deciduous molars.

By using these measurements, it is possible to determine whether total arch length mesial to the first permanent molars is sufficient to contain all the succedaneous teeth. The mesiodistal dimensions of the permanent cuspid and premolars are taken from the radiograms and totaled. This is compared to the space available between the distal contact point of the lateral incisor and the mesial contact area of the first permanent molar, with proper allowances for leeway requirements. Consideration is also given to incisor positions. These teeth may be rotated, crowded, or displaced labially or lingually. If so, an additional allowance must be included for their realignment over apical base, because properly aligned incisors require more space across the anterior portion of the arch than do incisors that are crowded together.

To determine the amount of discrepancy between bone and tooth structure, Carey[11] established a definite formula which included the anterior teeth. With this formula, he concluded:

> If the discrepancy is 2.5 mm. or less, we do not extract. If it is 2.5 mm. to 5.0 mm., we extract the second premolars, whenever possible, to obtain better esthetics. . . . If it is found to be greatly deficient, the first premolars may be extracted before the secondary dentition is complete to allow more favorable eruption of the cuspids.

The importance of these measurements lies in the fact that the dental mechanism is so delicately balanced that a discrepancy of 2 mm. or 3 mm. on each side is the difference between ideal tooth alignment and teeth that are crowded and irregular.

Nance[10] referred to this with his outside measurement from molar to molar when he said:

> The outside measurement will not be increased from the time of the mixed dentition to the time when all of the permanent teeth are present. Instead, there will be a definite decrease upon the succession of the permanent teeth. . . . Any orthodontic procedure intended to accommodate teeth in nonrotated positions is an effort to increase this outside measurement.

From these observations, three discouraging conclusions may be reached concerning possible growth in the areas of primary interest in any study on serial extraction: (1) no new bone of consequence in the anterior portion of the mandible is laid down by apposition after the age of 6 or earlier; (2) internal expansion by interstitial growth in this region is impossible; and (3)

arch length mesial to the first permanent molars tends to decrease rather than to increase on the interchange of teeth between the mixed and permanent dentitions.

What, then, is the alternative if normal development has failed to take place and deficient structures are already apparent at an early age? The implication is that the orthodontist cannot recover this anterior growth deficiency by appliance manipulation.[12] His alternatives are to extract and reposition the remaining teeth over the available supporting bone, or to attempt to move the molars distally. But, if the growth deficiency exists mesially to the first permanent molars, there is little reason to expect that the necessary space can be created by that much additional growth distally to the first molars—additional growth, that is, over and beyond that required by the molars themselves. Cephalometric evidence, as well as countless clinical relapses in certain types of cases, testifies to the difficulty in moving molars distally and making them stay there. Real trouble develops when it has to be done in all four buccal segments at the same time and at the same rate. Extraction, from clinical observation alone, if for no other reason at present, seems to offer the best solution.

Orthodontics must face the fact that the influence of its mechanical procedures rarely extends beyond the alveolar structures,[13] and that teeth expanded to form an arch which is larger than the apical supporting bone are subject to relapse, to gingival recession, and to alveolar resorption. Even at its maximum size, the alveolar process is a comparatively small structure. Alveolar bone, moreover, is normally narrower in the mandibular incisor region than in any other segment of the dental arches. This imposes a direct limitation on the amount of bodily movement that can be expected of mandibular incisors during treatment. If development generally is deficient in this area, alveolar destruction may occur at an early age even in the absence of orthodontic interference.

PROBLEMS OF GINGIVAL RECESSION

An example of early resorption in a developing malocclusion is illustrated in the case shown in Fig. 4. Marked gingival recession is apparent on the labially displaced mandibular right central incisor in a boy aged 7½ years. Obviously, this tooth has been thrust beyond the limits of the alveolar supporting bone. The associated crowding is but one of several symptoms of mandibular growth deficiency.

Sufficient space between the deciduous cuspids does not exist to realign the mandibular incisors without displacing all of them beyond apical base, and this movement would severely aggravate the gingival recession on the labial surface of the right central incisor. If anything, this central incisor should be repositioned lingually. It certainly should not be displaced farther labially in any effort to realign all the mandibular incisors.

That this was not the proper course is also indicated by the arch length measurements. Based on the most conservative measurements, a reduction in arch length was apparent in all four buccal segments. The combined mesiodis-

tal widths of the maxillary premolars and permanent cuspid on one side was 23.3 mm. Space available between the lateral incisor and first molar on the right side was only 20.3 mm.; on the left side it was but 18.7 mm. Including leeway requirements of 0.9 mm. on each side, this meant a deficiency of 9.4 mm. in maxillary arch length. The combined mesiodistal diameters of the mandibular premolars and permanent cuspid on one side was 24.3 mm. Space available on the right and left sides was 19.7 mm. and 23.1 mm., respectively.

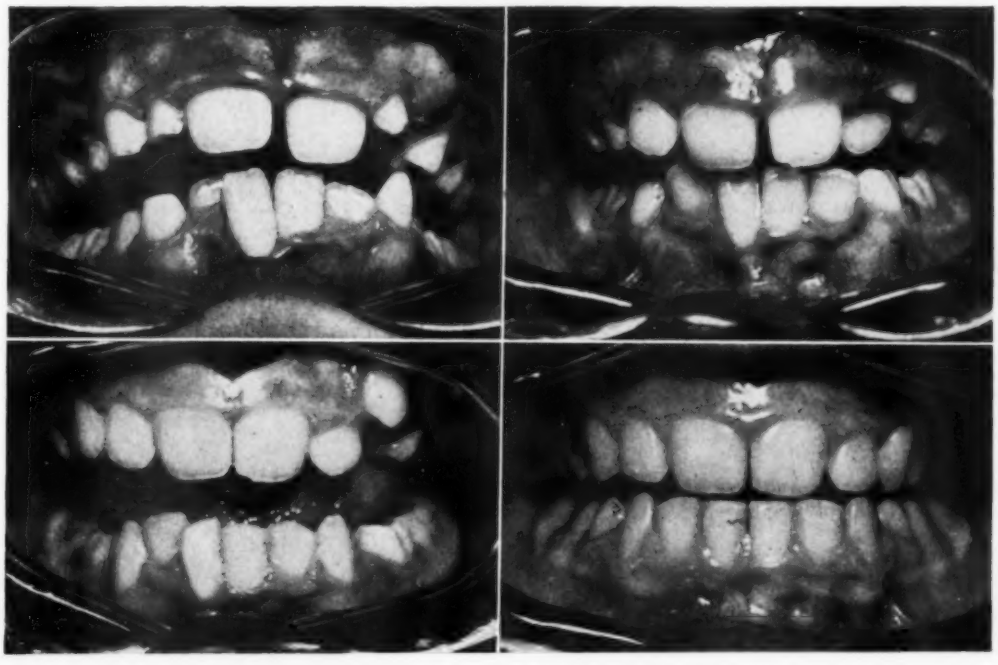


Fig. 4.—Marked gingival recession was apparent on the labial surface of the mandibular right central incisor when first observed. Improvement was noted as crowding was relieved by serial extraction. Reduction in arch length indicated that any attempt at ideal correction without extraction would result in extensive alveolar destruction. Full recovery of gingival tissues followed repositioning of anterior teeth over basal bone.

Including leeway requirements of 1.7 mm. on each side, loss of space in the mandibular arch totaled 9.2 mm. These posterior measurements, however, do not include the additional reduction in arch length resulting from the crowding of the mandibular incisors. This means that the cuspids must be moved distally if these incisors are to have enough room across the arch to be realigned properly over the narrow alveolar base.

For these reasons, a program of serial extraction prior to treatment was undertaken, involving first the deciduous cuspids, then the deciduous first molars, and finally the first premolars. When the timing is accurate the permanent cuspids, heretofore in danger of being blocked out labially, have a definite tendency to drift distally and lingually into the spaces formerly occupied by the first premolars. Following this pretreatment interception, an improvement was noted in the gingival tissues and in the general alignment of the mandibular six anterior teeth. Full edgewise treatment was not under-

taken until after the eruption of the cuspids and second premolars. The post-treatment intraoral photograph illustrates complete recovery of the gingival tissues, teeth well positioned over apical base, stable occlusal relations, and normal vertical development.

Photographs of this patient before treatment show reasonably passive and relaxed facial musculature which should not be disturbed by a labial reposi-

Fig. 5.—Photographs of case shown in Fig. 4. Facial contours originally disclosed reasonably acceptable proportion that should not be disturbed by labial movement of anterior teeth. Further improvement in mandibular development and muscular balance occurred during treatment.

tioning of the anterior teeth (Fig. 5). This surely would have occurred if any attempt at increasing arch length had been made. Moderate strain in lip closure already was apparent in the profile photograph. Final facial photographs reveal that muscular balance has been improved and that pleasing harmony and proportion in facial contours have been maintained.

Another case that presented extensive gingival destruction on the labial surface of the mandibular right central incisor at the early age of 8 years is shown in Fig. 6. A similar tendency was observed later about the left central incisor. Obviously, these teeth should not be subjected to any type of orthodontic attachment, anchorage or otherwise. Nor was it deemed advisable in this Class II malocclusion.

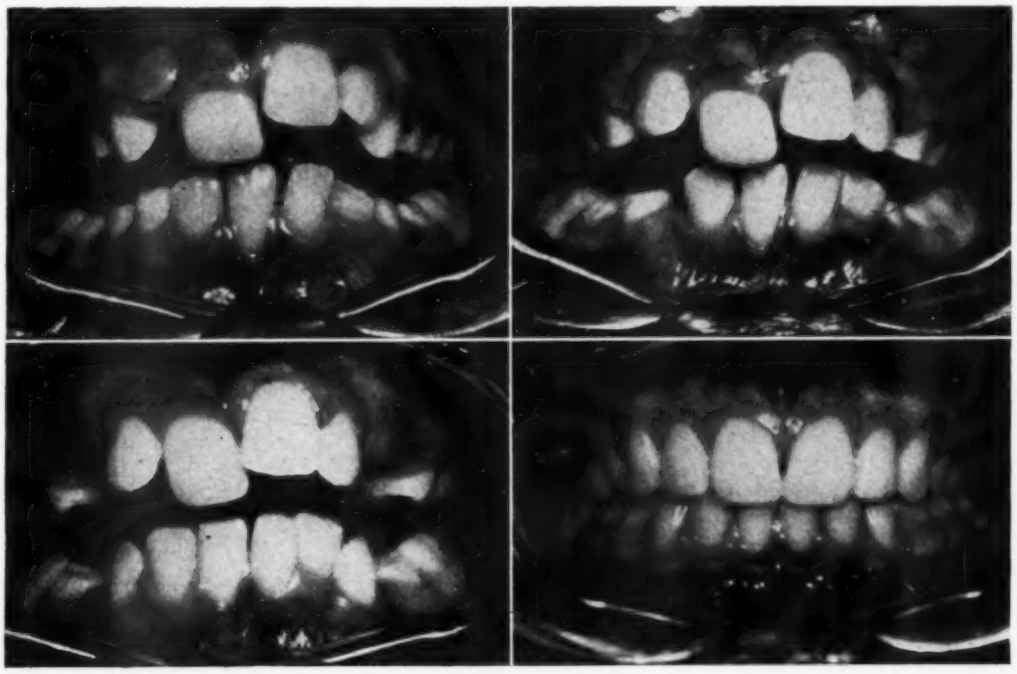


Fig. 6.—These photographs were taken at ages 8, 9, 10, and 13 years. They illustrate a Class II malocclusion with reduced arch length, gingival recession, and premature loss of the mandibular left deciduous cuspid. Serial extraction at the proper time and in the proper sequence of the remaining deciduous cuspids, the first deciduous molars, and the first premolars preceded active treatment with the edgewise appliance.

The case presented the usual diagnostic symptoms of shortening of arch length, early loss of one mandibular deciduous cuspid, a shift of the mandibular incisors to the left, and the left lateral incisor occupying the left cuspid space. Arch measurements showed that all four buccal segments were too short to accommodate the permanent cuspids and premolars between the lateral incisors and first molars.

Including leeway requirements, the deficiency in the maxillary arch was 7.9 mm.; in the mandibular arch it totaled 9.7 mm. Leeway must be considered in these cases because mesial repositioning of the first permanent molars occurs on the loss of the second deciduous molars, even when all normal leeway space has been lost.

Under these conditions a decision was made early on compromise treatment with serial extraction. Accordingly, the three remaining deciduous cuspids were removed to encourage improvement in mandibular incisor positions and to permit eruption of the maxillary right lateral incisor. After the second

intraoral photograph was taken one year later, the four first deciduous molars were extracted. The first premolars erupted promptly and were extracted on schedule.

So far there had been no change in the gingival tissues, but improvement was noted during the following year. Active treatment was undertaken at an earlier age than is customary in these cases because of the prominence of the left central incisor. It posed a psychological problem for the patient, and there existed also the constant fear of fracture from a fall or blow.

Fig. 7.—Photographs of case shown in Fig. 6. Mandibular development was deficient and muscular balance was disturbed in this Class II malocclusion. Improvement in facial contours resulted from treatment.

Orthodontic treatment proceeded with no complications, using a full edgewise appliance. The final intraoral photograph illustrates a stable result, teeth well positioned over apical base, and complete recovery of the gingival tissues. The original facial photographs reveal the developing Class II condi-

tion and the associated difficulty in normal lip closure (Fig. 7). The final facial photographs show relaxed musculature and an improvement in facial balance and proportion. No retention was placed other than an acrylic bite plane to encourage further vertical development.

RELATION OF INCISORS TO APICAL BASE

Fig. 8 illustrates another typical condition involving deficient supporting structures, early loss of a mandibular deciduous cuspid, and a shift of the

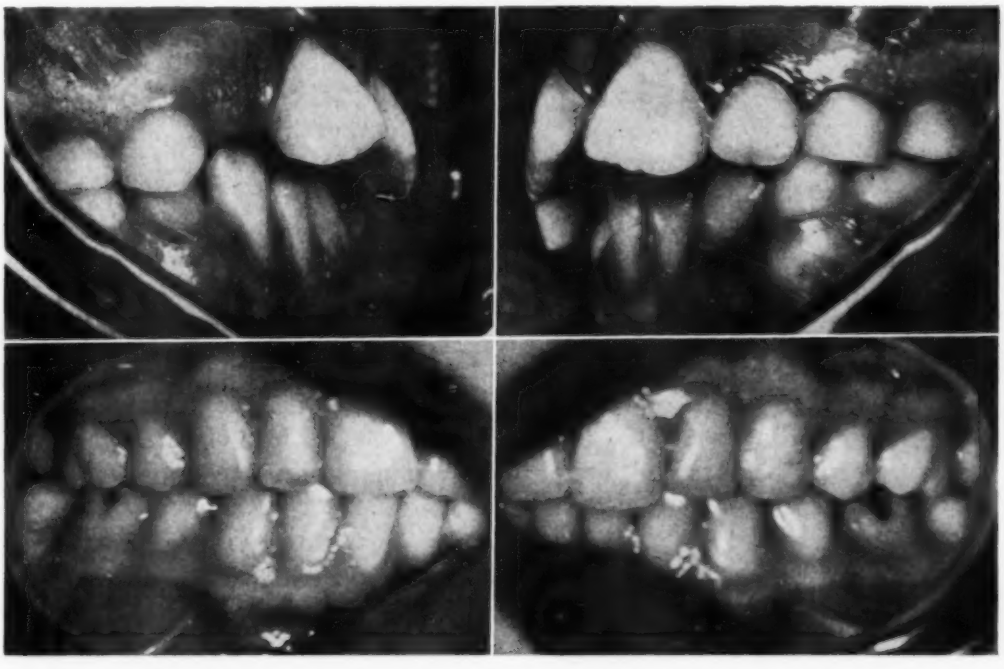


Fig. 8.—Premature loss of the right deciduous cuspid permitted the right lateral incisor to drift distally into the cuspid space. The labial plate of alveolar bone appears to be unusually thin and the gingival tissues have receded farther than ordinarily is observed in a child of 7. Serial extraction and treatment with the edgewise appliance created normal occlusal relations, teeth well positioned over basal bone, and vertical root inclinations on either side of the extraction areas.

median line to the right. Although the four mandibular incisors appear to be directly over apical base, the central incisors show greater gingival recession than is characteristic in a child of 7. The thin labial plate of alveolar bone is visible even in the photographs. It is questionable whether these mandibular incisors should be subjected to more than the slightest labial tipping action. Bodily movement most certainly would result in marked gingival recession and general denuding of the root surfaces. Early loss of the right mandibular deciduous cuspid and the resultant median line deviation are characteristic symptoms of growth deficiency in these cases. With no place else to go, the right mandibular lateral incisor drifted distally to within 1 mm. of contacting relations with the first deciduous molar.

Reduced arch length is apparent in the mandibular arch. It is not so obvious in the maxillary arch because of the labial inclination of the central incisors. Repositioning these teeth lingually creates the same condition of shortening of arch length as in the mandibular arch.

Obviously, a complicated malocclusion is in its earliest stages of development. The orthodontic responsibility is to attempt to forecast developmental possibilities even at this early age. Cuspids and second molars are not due to erupt for another five years, at the age of 12. One alternative, of course, is to embark on what promises to be a three- or four-year treatment period in an attempt to create enough space for all the permanent teeth. Relapse, followed by a second period of treatment and belated acceptance of an extraction compromise, would be a distinct possibility. Another alternative is to delay any treatment until all the permanent teeth have erupted in whatever positions they are able to assume in these deficient arches and then determine what method of treatment is most desirable. It seems illogical, however, to require the alveolar bone to develop a deformed structural pattern which later must be altered to harmonize with a normal alignment of the teeth.

The third possibility, and the one chosen for this case, was to follow a program of serial extraction on the conviction that full development of the supporting structures could not be achieved. Extraction of the three remaining deciduous cuspids was undertaken after the usual period of observation to determine the growth trend. The course of eruption of the permanent teeth was followed radiographically so that the first deciduous molars and the first premolars could be extracted at the proper time and in the proper sequence. Active treatment was delayed until after the eruption of the cuspids and second premolars.

The final intraoral photographs illustrate the orthodontic correction two years after the removal of all appliances. The teeth are well positioned over alveolar supporting structures, median line and occlusal relations are restored, and the overbite and overjet are within normal range. Equally important, there has been no destruction of gingival tissues or of the alveolar structures.

Serial extraction also was determined to be the most favorable compromise in the Class II, Division 2 malocclusion illustrated in Fig. 9. The typical condition, which is a diagnostic factor in these patients when first observed, was again the premature loss of the mandibular right deciduous cuspid and the characteristic shift of the mandibular incisors and median line to the right. The resulting reduction in mandibular arch length ordinarily is not characteristic of Class II, Division 2 malocclusions.

Surprisingly, a minus quantity for leeway requirements also existed in the maxillary arch, in spite of the marked labial displacement of the lateral incisors. Including leeway, the total maxillary deficiency was 5.8 mm. The mandibular arch was short by 6.9 mm. on the right side. On the left side, the available space was 22.5 mm., exactly the same as the total widths of the mandibular premolars and permanent cuspid. This was possible only because the mandibular incisors had shifted to the right. All teeth were in tight con-

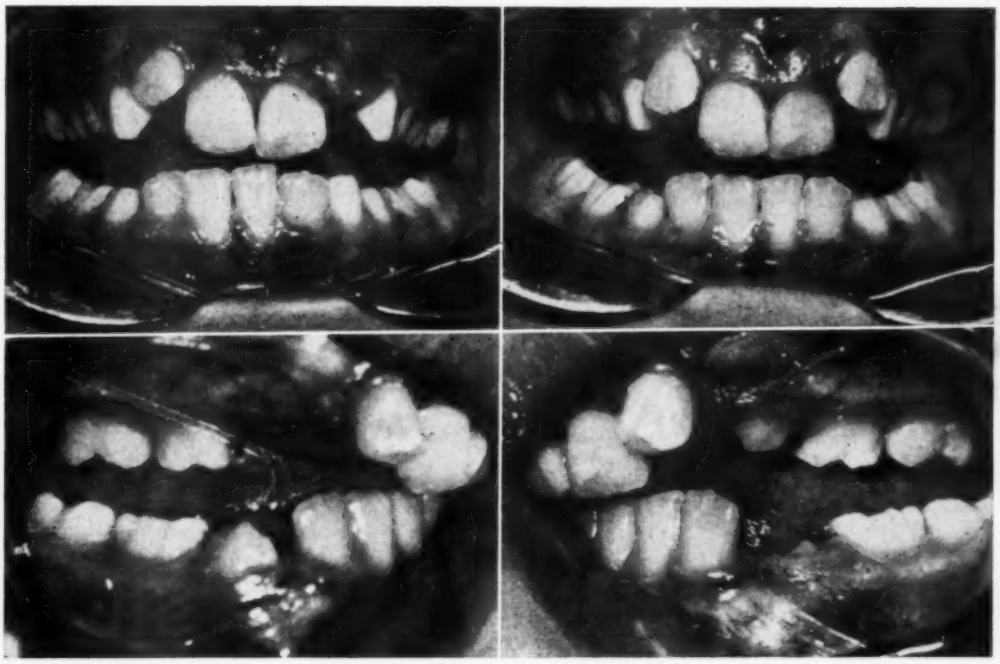


Fig. 9.—Improvement in median line relations followed within a few months the extraction of the remaining mandibular left deciduous cuspid in this Class II, Division 2 malocclusion. First premolar eruption occurred on schedule after further serial extraction of the deciduous first molars. The lower photographs illustrate the ideal time for the extraction of the first premolars. Final correction is shown in Fig. 10.

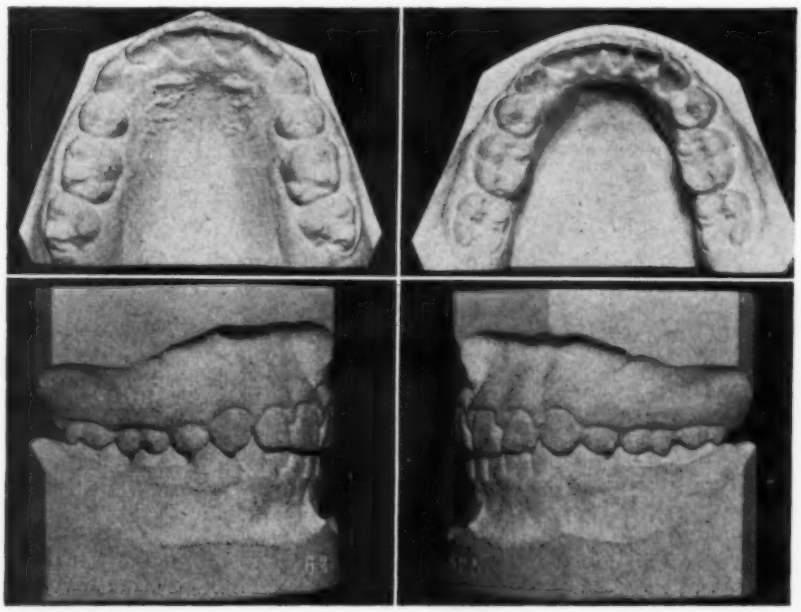


Fig. 10.—Final correction of the Class II, Division 2 malocclusion shown in Fig. 9. Teeth are vertical on either side of the extraction areas, molar relations are normal, and the anterior teeth are well positioned over basal bone.

tact from the right lateral incisor completely around the arch to the left first permanent molar. Repositioning the incisors back to the center of the arch meant, therefore, that this molar and all the teeth mesial to it had to be moved distally if all the teeth were to be retained. Any such distal movement of the mandibular left first molar meant that much additional distal movement of the maxillary first molar, since these teeth were already in a Class II relation.

Labial movement of the mandibular incisors was not the answer. Even at this early age, they were just barely able to maintain their normal labiolingual positions over the narrow alveolar bone. But extraction of the remaining left deciduous cuspid permitted the incisors to shift back to center without mechanical assistance while still retaining their ideal positions immediately above the supporting bone.

Positional changes of the cuspids and first premolars were observed regularly by radiographic means so that the first deciduous molars could be removed at the most favorable time. No mandibular lingual supporting arch wire was necessary in this case; the molars showed no tendency to move farther mesially. On the contrary, the space increased slightly on the right side as self-correction of the median line relation took place. Eruption of the first premolars followed according to plan, after which they were extracted to make room for the oncoming permanent cuspids.

Appliance therapy with the edgewise mechanism was not undertaken until the second deciduous molars were lost by natural means and cuspid and second premolar eruption were well on the way. Final results six months following retention are shown in the photographs of the models (Fig. 10).

The final extraction case is one in which there can be no question about following a serial extraction program (Fig. 11). The intraoral photographs show a Class I malocclusion in a girl of 9 years, 9 months. She had been under continuous supervision with models, photographs, and radiograms since the age of 7. These photographs illustrate typical development following earlier natural loss and extraction of the deciduous cuspids. Proper timing now calls for the extraction of the four first deciduous molars.

Shortening of arch length was unfavorable, based again on the most conservative measurements. On the maxillary right side, for example, the cuspids and premolars required 23 mm., but the space available between the lateral incisor and first molar was only 15.2 mm. This deficiency of 7.8 mm. is more than the width of a premolar. Even with extraction, there was not enough room for the remaining teeth.

At the risk of being repetitous, again it should be stated that the additional space required by the cuspid and premolars can be gained only by moving incisors labially or molars distally. Expansion of the dental arches is not the answer; anteroposterior growth is deficient in these cases, not lateral development. Although the mandibular incisors in this patient required labial tipping, enough space could not be gained by such a course except by displacing these teeth bodily off basal bone and inviting inevitable collapse.

It was not possible to move the molars far enough distally to obtain the necessary space. Evidence accumulated at the close of active treatment to

confirm this conclusion. After the serial extractions had been accomplished, there was undoubtedly a slight mesial movement of the maxillary first permanent molars. Even with the additional space thus provided, the maxillary second molars showed symptoms of posterior crowding by erupting far to the buccal of their mandibular opponents.[14] More than usual time and pressure were required to move them distally and lingually into normal buccolingual relations with the mandibular second molars.

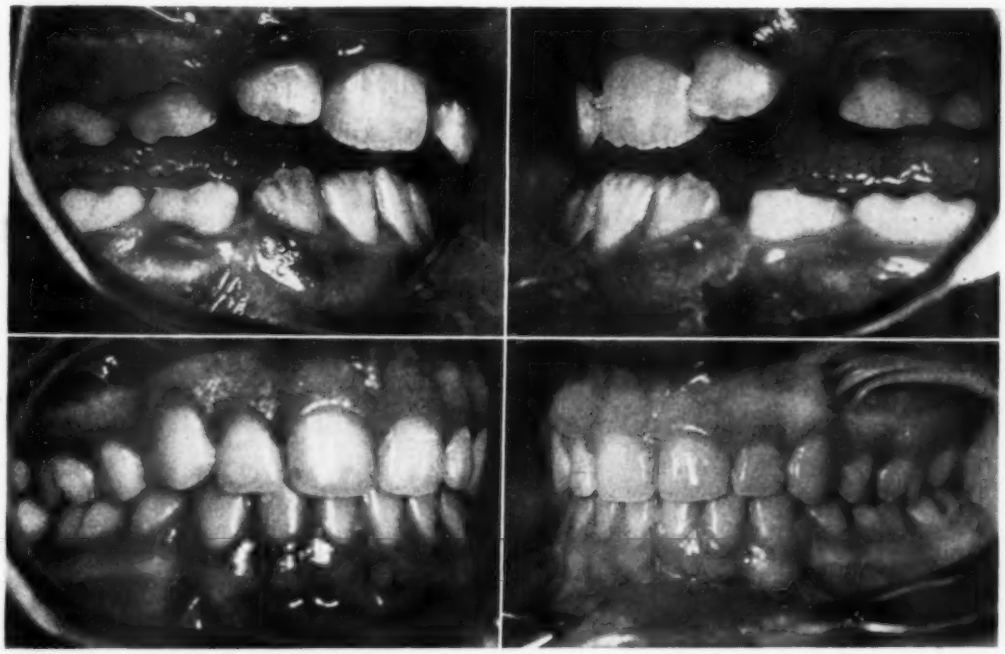


Fig. 11.—The upper photographs illustrate dental relations following earlier natural loss and extraction of the deciduous cuspids. Proper timing now calls for the extraction of the first deciduous molars to permit the first premolars to precede the cuspids in eruption. The lower photographs illustrate the final correction with the edgewise appliance.

The intraoral radiograms also disclosed signs of posterior crowding and impaction in the mandibular second and third molar areas. Even if it were possible by orthodontic means to create additional growth in these posterior regions, simultaneous distal movement of all the maxillary and mandibular molars would be difficult with our present mechanical aids. Increased impaction would be the more likely result. For these reasons, the only course left in this case was the removal of certain intervening teeth and the repositioning of the remaining teeth in normal alignment over apical base. Only in this manner can stability be achieved and pleasing facial features maintained.

PRINCIPLES AND PROCEDURES IN SERIAL EXTRACTION

A few final comments should be made on principles and procedures in the serial extraction of teeth in orthodontics. First and foremost, it must be repeated that serial extraction is not a program to be undertaken in an indis-

criminate manner. Many months of patient observation is the rule rather than the exception. Authentic serial extraction cases are seen only in limited numbers in any orthodontic practice, and every effort must be made to attain normal occlusion with a full complement of teeth when it can be accomplished.

It is as important to know when not to extract as it is to know when serial extraction is to be considered. The mandibular arch is the final diagnostic guide, with particular emphasis on the harmonious relation of the mandibular incisors to basal bone. The importance of the mandibular arch cannot be overemphasized; in fact, it is the basis for diagnosis in these cases, whether they are Class I or Class II malocclusions.

Mandibular incisors are stable only when normally positioned over basal bone. Equally important is the retention of the mandibular deciduous cuspids until the normal time for their loss. When the supporting structures are adequate, these cuspids are fully able to maintain their positions in normal arch alignment during the eruption of the permanent incisors. It follows that the premature loss of a mandibular deciduous cuspid is the result, and not the cause, of a deficiency in arch length.[15] To state it another way, normal basal bone will create normal arch development, but artificial expansion of a dental arch beyond the limits of the apical base will not, in turn, develop normal basal bone. In the final analysis, serial extraction can be reduced to but one question: is there enough basal bone, present or potential, to support all the teeth in normal, stable, and pleasing positions?

This means that extraction definitely is not indicated in mandibular arches that show but slight irregularity of the incisors, or in mandibular arches in which a favorable growth trend can be determined during the period of supervision. Moderate crowding of the mandibular incisors is not necessarily abnormal; on the contrary, it may be characteristic of the human dentition.[16] But extreme crowding, gingival recession, and premature loss of mandibular deciduous cuspids are not acceptable deviations from the normal. These are symptoms of developmental deficiencies that require compromise measures if failure and increased malocclusion are to be avoided.

Although growth in the anterior portion of the maxilla also appears to stop after the eruption of the maxillary first permanent molar,[17] similar irregularities in this arch do not seem to be as complicated or as difficult to treat as in the mandibular arch. Usually maxillary teeth respond promptly to ideal treatment methods, and are so treated when mandibular development is normal. Maxillary crowding in these cases seems to depend on a mesial migration of posterior teeth; mandibular crowding is more likely the result of deficient supporting structures. When the mandibular arch is normal, maxillary posterior teeth can be moved distally with extraoral anchorage, with or without the occasional extraction of the maxillary second molars.

Maxillary molars are also able to function efficiently in a Class II relation with mandibular molars after the extraction of maxillary first premolars, with no equivalent extraction in the normal mandibular arch. This condition does not hold true when the irregularity is greater in the mandibular arch. Ex-

traction in the mandibular arch calls for extraction in the maxillary arch. The same functional efficiency does not exist when the mandibular first molar is moved forward so that its chief antagonist is a maxillary second premolar.

CLINICAL OBSERVATIONS DURING THE PERIOD OF SUPERVISION

The emphasis in serial extraction is placed on the interception of extreme forms of malocclusion before they become fully established deformities in the permanent dentition. In serial extraction the orthodontist is interested primarily in the growth potential mesial to the first permanent molars after their eruption and the eruption of the incisors. If he cannot create growth in that region, and arch reduction already is apparent, his alternatives are extraction or distal movement of molars. Certainly labial repositioning of anterior teeth off basal bone is not the answer. However, if the unerupted mandibular second molars are in close contact with the first molars, and the third molars are impacted against the second molars, then it is clinically certain that effective distal repositioning of the first molars is not only questionable but more frequently impossible. If, in addition, the disproportion between size of teeth and length of basal bone is extensive, extraction is the only solution if permanence, stability, and a pleasing appearance are to be achieved.

Particular attention also must be given to the orderly eruption of the first premolar and the permanent cuspid. Ideally, the first premolar precedes the cuspid in eruption. When it does, there is ample time following the subsequent extraction of the first premolar for the cuspid to migrate distally as it proceeds occlusally (Fig. 3).

This ideal sequence is more often the rule in the maxillary arch than in the mandibular arch. If the mandibular cuspid erupts first, it tips distally and occupies part of the first premolar space. This retards eruption of the first premolar and increases the difficulty in its extraction. Periodic radiograms accurately disclose the course of eruption of these teeth. Enucleation of the first premolar therefore must be considered when the cuspid appears to be erupting ahead of schedule.

Many of these cases require preliminary mandibular lingual supporting appliances to prevent mesial migration of molars and further collapse of the arches. These are indicated particularly in the absence of sturdy second deciduous molars. Occasionally acrylic bite planes are indicated to encourage further vertical development during the period of supervision. Almost invariably they are necessary if the bite already is closed. The goal is always normal occlusion with a full complement of teeth, but the purpose of the observation period may be defeated if the extraction program is undertaken too early and further growth is interrupted as a result. Even when serial extraction is necessary, premature removal of teeth involves the risk of retarding future development in arches that are already deficient. Although not directly involved in serial extraction treatment, second deciduous molars should also be left undisturbed until the normal time for their loss. These teeth support the occlusion, both vertically and horizontally, and the second

premolars may be unusually slow in eruption—characteristics again more typical of the mandibular arch than of the maxillary arch. As with other serial extraction procedures, they cannot be hurried.

When the period of active treatment finally arrives, it can be accomplished with much more precision and much less stress on anchorage units than if the condition had been allowed to develop into a fully matured malocclusion in the permanent dentition. In the meantime, the procedure known as serial extraction has been essentially a program of patience, of continuous observation and study, of proper timing, and of delay and postponement until growth and development have accomplished their mission.

REFERENCES

1. Howes, Ashley E.: Case Analysis and Treatment Planning Based Upon the Relationship of the Tooth Material to Its Supporting Bone, AM. J. ORTHODONTICS AND ORAL SURG. **33**: 499-533, 1947.
2. Graber, T. M.: New Horizons in Case Analysis—Clinical Cephalometrics, AM. J. ORTHODONTICS **38**: 603-624, 1952.
3. Kelly, Eugene J.: Treatment in the Mixed Dentition, Angle Orthodontist **20**: 102-108, 1950.
4. Terwilliger, Kenneth F.: Treatment in the Mixed Dentition, Angle Orthodontist **20**: 109-113, 1950.
5. Hunter, John: Natural History of the Human Teeth, ed. 1, London, 1771, J. Johnson.
6. Massler, Maury: The Growth Pattern of the Cranial Vault in the Albino Rat as Measured by Vital Injections of Alizarine Red S, Master's Thesis, University of Illinois, 1941.
7. Brodie, Allan G.: On the Growth of the Jaws and the Eruption of the Teeth, Angle Orthodontist **12**: 109-123, 1942.
8. Moore, Alton W.: Head Growth of the Macaque Monkey as Revealed by Vital Staining, Embedding, and Undecalcified Sectioning, AM. J. ORTHODONTICS **35**: 654-671, 1949.
9. Sicher, Harry: The Growth of the Mandible, AM. J. ORTHODONTICS AND ORAL SURG. **33**: 30-35, 1947.
10. Nance, Hays N.: The Limitations of Orthodontic Treatment. I. Mixed Dentition Diagnosis and Treatment, AM. J. ORTHODONTICS AND ORAL SURG. **33**: 177-223, 1947.
11. Carey, C. W.: Linear Arch Dimension and Tooth Size, AM. J. ORTHODONTICS **35**: 762-775, 1949.
12. Brodie, Allan G.: Facial Patterns: A Theme on Variation, Angle Orthodontist **16**: 75-87, 1946.
13. Brodie, Allan G., Downs, William B., Goldstein, A., and Myer, E.: Cephalometric Appraisal of Orthodontic Results, Angle Orthodontist **8**: 261-352, 1938.
14. Bishop, E. Allen: Treatment of Mixed Dentition, Angle Orthodontist **20**: 99-101, 1950.
15. Kjellgren, Birger: Serial Extraction as a Corrective Procedure in Dental Orthopedic Therapy, Acta odont. scandinav. **8**: 17-34, 1948.
16. Dewel, B. F.: Clinical Observations on the Axial Inclination of Teeth, AM. J. ORTHODONTICS **35**: 98-115, 1949.
17. Henriques, Alvaro C.: The Growth of the Palate and the Growth of the Face During the Period of the Changing Dentition, AM. J. ORTHODONTICS **39**: 836-858, 1953.

708 CHURCH ST.

THE TONGUE AND DENTAL FUNCTION

R. E. Baker, D.D.S., St. Paul, Minn.

A NEOPHYTE orthodontist attempting to select a topic for a thesis after he has spent only a few years in practice is, without doubt, in a dilemma. If he had taken a graduate course in orthodontics, it is possible that he would have encountered some particular phase in which he could have done suitable research, or, if he had practiced for many years, he undoubtedly would have a great wealth of information and material upon which to draw. Being nothing but a fledgling whose sole attempt has been to learn and practice orthodontics with little thought of original creating, I prepared this thesis on a topic which has been a perplexing problem of significant proportion to cause me, at least, much anxiety and disappointment. This article is an attempt to correlate what is known about a subject with clinical observations made during the past five years in the practice of orthodontics.

A fine gentleman with a keen intellect, who taught undergraduate physiology, once asked the following question in an examination: "What's about blood?"

Not one of the students answered correctly the one word that he desired for an answer, which was "endothelium."

The refined simplicity and absolute truth of the question and answer were undeniable. Perhaps one could similarly introduce this thesis by presenting a similar type of question and answer, such as:

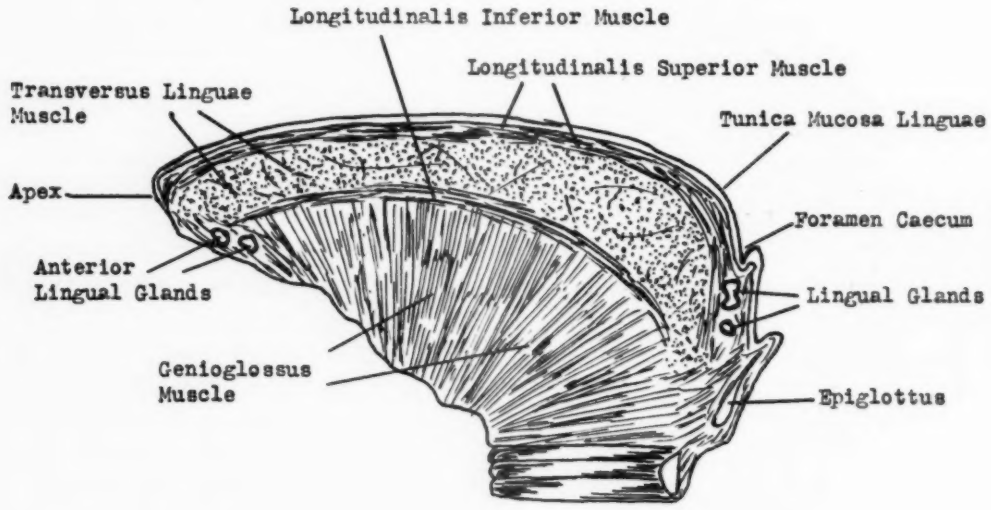
"What are the teeth and jaws about?"
"The tongue."

THE ANATOMY OF THE TONGUE (FIG. 1)

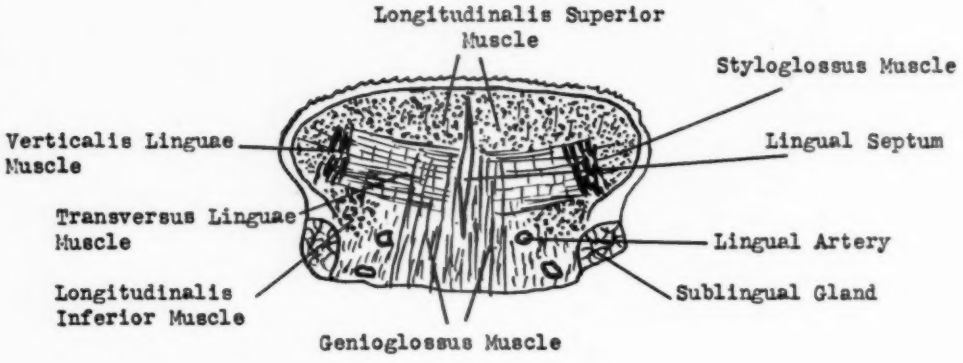
The tongue is located in the floor of the mouth. It is a muscular organ with a mucous membrane covering.[1] There are two groups of muscles associated with the tongue: the extrinsic and the intrinsic.[2] The extrinsic muscles include those which are both within and without the tongue and consist of the hyoglossus, chondroglossus, genioglossus, styloglossus, and palatoglossus; the intrinsic muscles include those which are located wholly within the tongue and consist of the longitudinalis superior, longitudinalis inferior, transversus linguae, and verticalis linguae. The blood is supplied to the tongue by right and left lingual arteries which are branches of the external carotid arteries; lingual veins carry the blood to the internal jugular vein.[3]

This thesis, which was given as a partial fulfillment of the requirements for certification by the American Board of Orthodontics, is being published with the consent and the recommendation of the Board, but it should be understood it does not necessarily represent or express the opinion of the Board.

The motor nerve supply is the hypoglossal nerve, which supplies both the intrinsic muscles and all but one of the extrinsic muscles. That one is the palatoglossus muscle, which is innervated from the vagus nerve through the pharyngeal



A, Sagittal Section Through The Tongue
(After Spalteholz)



B. Frontal Section Through Body of the Tongue
(After Spalteholz)

Fig. 1.—The Anatomy of the tongue.

plexus.[3] This article does not include the sensory functions of the tongue within its scope and, therefore, will not include a discussion of the sensory innervation.

There are some abnormal physical variations to be found in studying the tongue. Forked tongue is a rare anomaly, but ankyloglossia (Fig. 2), a condition in which there is an excessive frenum attachment beneath the anterior

portion of the tongue to the mandibular lingual alveolar tissues, is more frequently noticed.[4] Microglossia has been listed as an uncommon variation. Macroglossia is the one variation that almost all orthodontists have seen clinically at one time or another.[5] The position that a tongue assumes may lead to an incorrect macroglossia diagnosis; however, when there is reason to suspect an enlarged tongue, there invariably are indentations or grooves along the lateral edges of the tongue running vertically (Fig. 3) showing where the

Fig. 2.

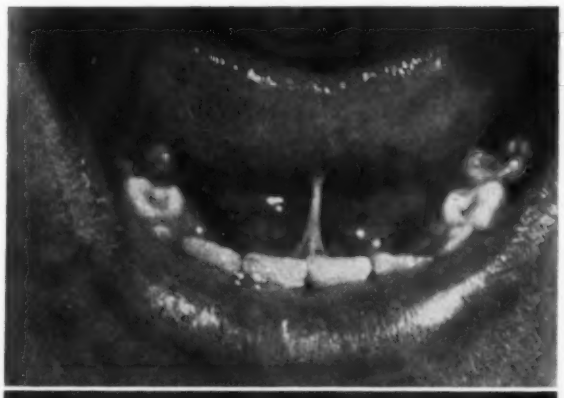


Fig. 3.

Fig. 2.—Ankyloglossia.
Fig. 3.—Indentations on the edge of the tongue in macroglossia.

organ approximates the lingual surfaces of the teeth. Glossoptosis, the downward and backward displacement of the tongue, has been mentioned also as an abnormality.[6]

THE DEVELOPMENT OF THE TONGUE

The tongue is seen at the end of the first month of intrauterine life. As the tongue develops, it has two parts: the body and the root. A fibrous connective tissue layer divides the tongue into two halves. It begins development from a pair of lateral lingual swellings in the floor of the mouth at the level of the first branchial arch. They fuse medially, forming the body. The root develops from the second, third, and fourth branchial arches. The muscles seem to

develop from thickened mesoderm in the floor of the mouth.[7] The tongue is first seen at 1 month and is found to be in a completed state at 8 weeks.[8] It is found at birth that the tongue protrudes beyond the alveolar ridges, which facilitates the necessary sucking process, but, as the maxillae develop, the tongue becomes enclosed within the alveolar processes.

FUNCTIONS OF THE NORMAL TONGUE

The normal tongue has several very important normal functions of interest to the orthodontist, as well as the sensory functions which will not be discussed. In mastication, the tongue, with the aid of the buccal tissues and muscles of mastication, has the important duty to perform of directing that which is to be reduced by mastication between the teeth. It does so by placing the food in position, chiefly by the anterior and lateral portions of the body of the tongue pushing the food buccally when mastication begins. During the grinding process it expands rhythmically to the lingual surfaces of the teeth, holding and repositioning the food by a peristaltic-like movement until it is sufficiently reduced for deglutition.

In deglutition the tongue is essential, first of all, in forming the bolus, and then in propelling the bolus into the pharynx in the first stage of swallowing.[9]

Immediately after swallowing, the position of the tongue is found to be contacting the hard palate while the soft palate is pulled away downward against the posterior portion of the tongue. One minute later the tongue drops away from the hard palate just lingual to the maxillary incisors; the soft palate raises away from the posterior portion of the tongue. It had been generally believed that the tongue at rest is invariably held against the palate.[10]

The formations of sounds in speech is another function of the tongue. The musculature is ideally suited to an amazing variety of acrobatics, which are necessary for the formation of these sounds. The tongue is in perpetual motion during speech and takes a very necessary part in forming the sounds for "s," "z," "t," "d," "sh," "e," "g," "l," and "r." Some of the necessary movements are protrusion between the anterior teeth, as in "b," and elevation of the tip alone directly behind the maxillary incisor teeth, as in the sound "s." Further movements would include the elevation of the lateral dorsal portions directly behind the tip and with the tip slightly depressed, as in "sh"; arched to touch the posterior part of the hard palate, as in "k"; slapping the tip against the lingual surfaces of the maxillary incisors, as in "l"; and retracted with the tip raised near the middle of the hard palate, as in "r" (Fig. 4).

In normal breathing using the nasal air passages, the tongue is found to be in a rest position, a description of which follows later. In normal forced breathing through the mouth, such as an athlete may do upon exertion, the mandible is depressed, the lips are opened, and the tongue laterally remains in contact with the lingual surfaces of the mandibular teeth dropping away from the maxilla; the anterior part of the tongue, including the tip, is lowered to contact the lingual surfaces of the mandibular anterior teeth. The dorsal surface of the body of the tongue is slightly depressed medially.

The fact that the tongue is in motion much of the time gives vent to the fact that it does, by contact, cleanse the lingual, and parts of the occlusal, surfaces of the teeth.

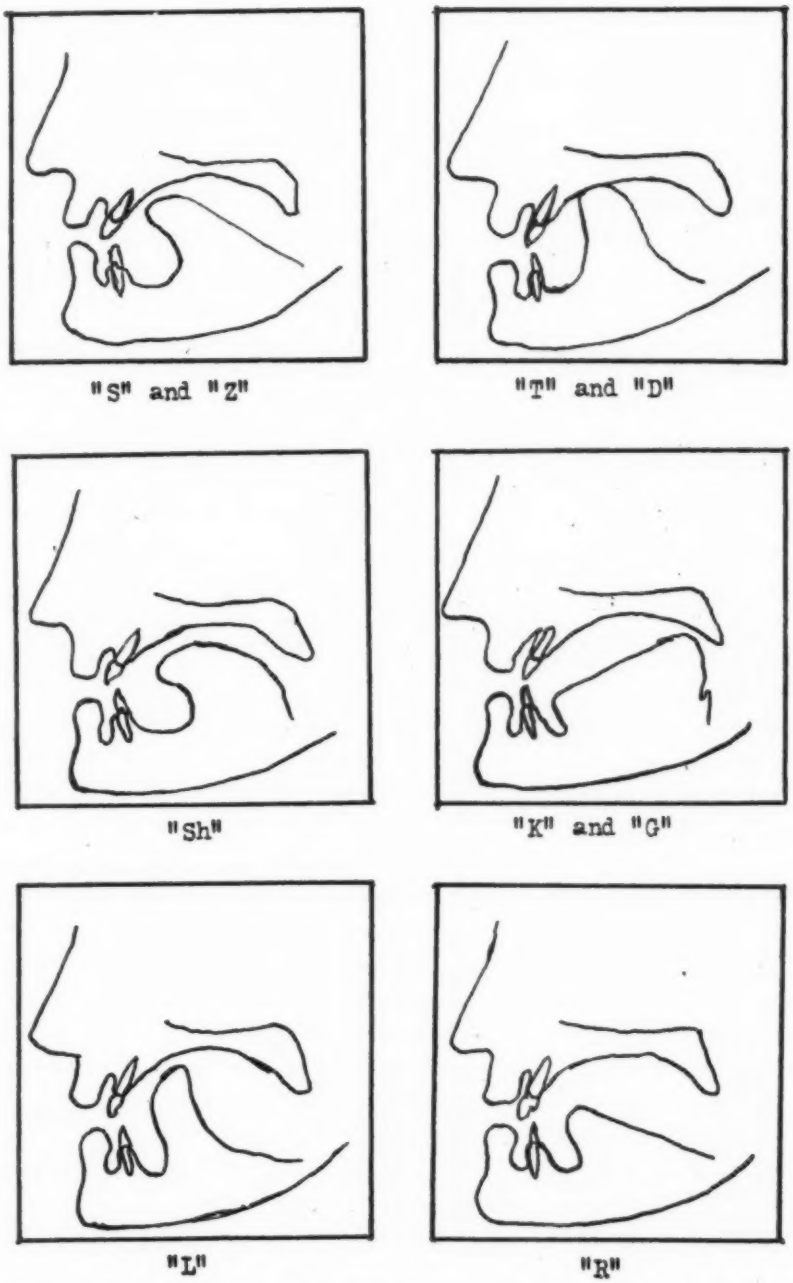


Fig. 4.—Tongue acrobatics in the formation of sounds. (After Kessler: *Oral Hygiene*, May, 1951.)

When the tongue is not in function in one of its many movements, it remains normally in the rest position mentioned previously in the paragraph on breathing. A group study using motion pictures of gross movements of soft tissues, observations of living tongues in function, and other means presented excellent conclusions concerning the tongue. It was found that 65 per cent of cases

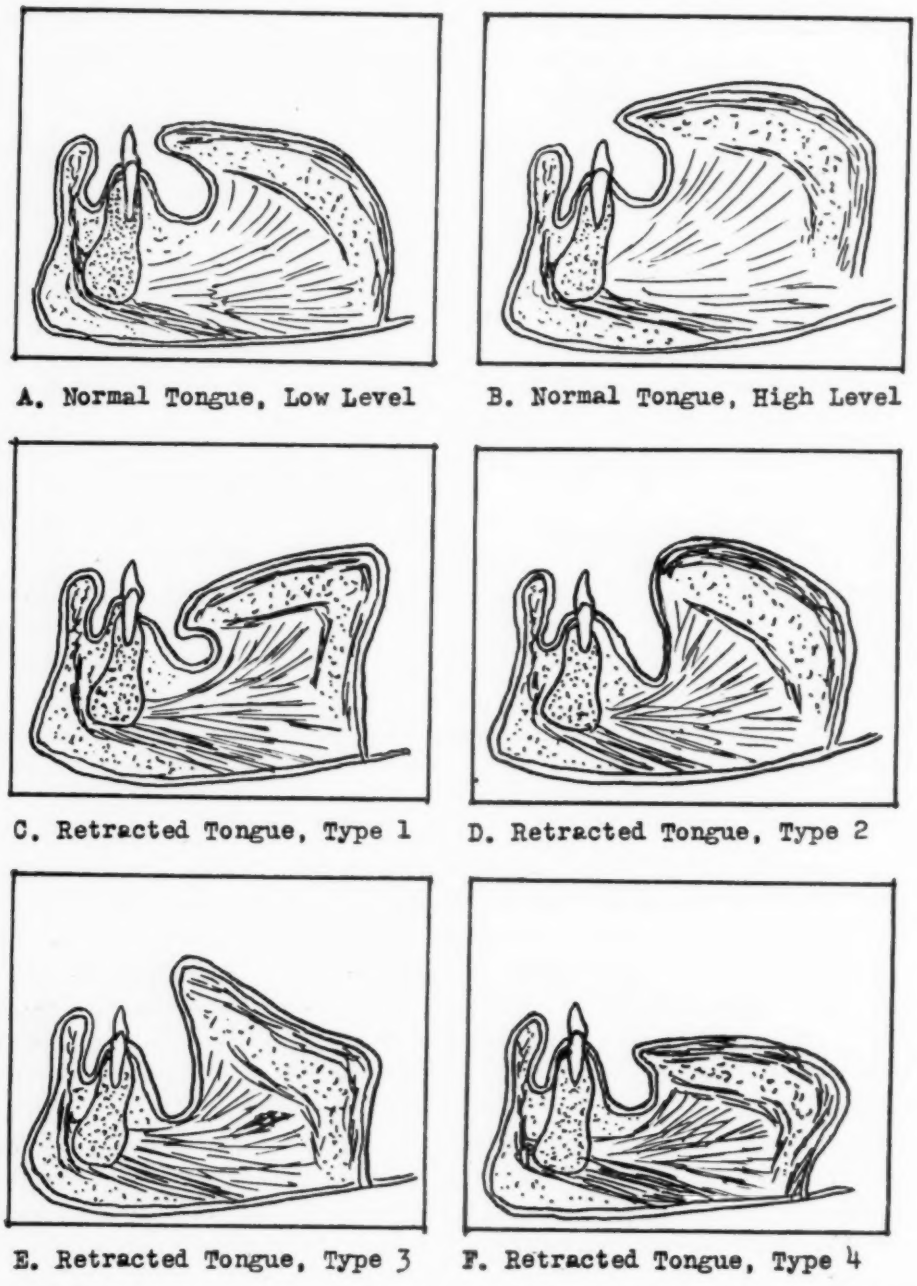

A. Normal Tongue, Low Level
B. Normal Tongue, High Level
C. Retracted Tongue, Type 1
D. Retracted Tongue, Type 2
E. Retracted Tongue, Type 3
F. Retracted Tongue, Type 4

Fig. 5.—Normal and abnormal tongue positions. (After Wright: *J. Am. Dent. A.*, September, 1949.)

examined showed ". . . the normal position of the tongue is a position in which it lies completely lax in the floor of the mouth, the apex slightly below the incisal edges of the mandibular incisors and the dorsum visible above the teeth in all parts of the mouth." Further, it was found that the tongue fills irregularities with almost fluid action. Normally positioned tongues at rest, it was noted, are found in high level (Fig. 5, *A*) or low level (Fig. 5, *B*). This level seems to be controlled by the vault of the maxilla.[12]

ABNORMAL FUNCTIONS OF THE TONGUE

The abnormality of any one or combinations of more than one function of the tongue can conceivably create a problem for the orthodontist. These abnormalities are usually referred to as tongue habits. Physical changes in the tongue, it must be mentioned, can affect the function; for instance, it has been said that mouths cannot function normally if the apex of the tongue is removed.[12] During the process of mastication, particularly in distocclusion malocclusions, the tongue is forced sometimes laterally or buccally between the maxillary and mandibular teeth to an excessive degree.

In deglutition there not infrequently is found a tongue thrust between the maxillary and mandibular incisor teeth. This takes place at or immediately after the time the bolus enters the pharynx.

Frequently defects in speech are due to improper positioning of the tongue in sound formation. Ankyloglossia may contribute to improper function of this type, but this fact has been considered of minimal importance by speech therapists.[13] Most orthodontists have observed a patient with a lisp exhibiting an overactive tip of the tongue, which is thrust between the anterior teeth often during speech. Many other faulty positions are to be found upon careful examination.

In breathing there are unquestionably cases due to allergic, asthmatic, or hypertrophic conditions in which the nasopharynx is blocked, making mouth breathing necessary throughout the life of the individual. When mouth breathing becomes of such importance, there are clinical observations noticeable in the variation from the normal in the position of the tongue. The tongue remains at all times in a downward deflected position; at rest, wholly within the confines of the mandible and the mandibular teeth; in mastication and deglutition, similarly downward; in speech, which is very frequently defective, the tongue does make upward movements, but these movements are of quicker or shorter duration than normal because the tongue must be lowered to allow breathing. No case of ankyloglossia with this type of mouth breathing has been observed by me.

Abnormalities in tongue position at rest were found in 35 per cent of cases studied in an excellent survey.[14] The abnormalities found were four different types of retracted positions. They were listed as "1. A retraction by which the apex of the tongue curls downward from the mandibular incisors and dorsally along the frenulum, while the radix of the tongue is elevated. (Fig. 5, *C*.) 2. The apex seems to disappear into the body of the tongue and

gives it a squared appearance. (Fig. 5, *D.*) 3. The apex of the tongue curls upward and dorsally from the mandibular incisors. (Fig. 5, *E.*) 4. The body of the tongue is depressed into the floor of the mouth, moving the entire mass dorsally." (Fig. 5, *F.*)[14]

An earlier study substantiated the retracted position of the tongue as being at fault and found often enough to be of interest.

The tongue has also been found in another abnormal position at rest. This position shows, clinically, a laterally expanded tongue between the maxillary and mandibular teeth, in some cases between all of the teeth mesial to the second molar teeth.

THE RELATION OF NORMAL TONGUE AND DENTAL FUNCTION

The normal growth, development, and function of the tongue integrated with the normal growth, development, and function of all other related oral and dental structures will inevitably lead to what is considered to be normal jaw relationships and normal dental function. This is not to be construed to mean that the tongue assumes a separate distinctive role, but rather that it is one of several component parts all of whose growth, development, and function must be normal if normal oral and dental relationships are to be the result.

THE RELATION OF ABNORMAL TONGUE AND DENTAL FUNCTION

If the previous paragraph is true, it could be assumed that abnormal growth, development, or function of any one, or a combination of more than one, of the component dental or oral structures, including the tongue, could lead to malrelationships and dental malfunction. Further, if this is true, just what are the dental malfunctions that could possibly be caused, wholly or partially, by a malformed or malfunctioning tongue?

As mentioned previously, macroglossia is a condition that has been noted for years by orthodontists. The usual findings in a mouth exhibiting an enlarged tongue are a spacing of the teeth with subsequent loss of approximal contact or a mesial movement of the lower arch.[16] There may or may not be an imperfect dental function; there is always an unsightly esthetic situation which orthodontists are usually called upon to treat (Fig. 6).

Buccal open-bites (Fig. 7) appear to be caused by the lateral thrusting of the tongue between the occlusal surfaces of the buccal teeth during mastication, deglutition, speech, and at rest position. In most cases, anterior open-bites appear to be caused by the tongue thrust that occurs during deglutition. The forces which maintain an anterior open-bite (Fig. 8) appear to be contributed to by speech-defective individuals with a lisp of faulty sounding or formation of the sounds "s," "z," and "th." The tongue is thrust frequently against the lingual surfaces of the maxillary incisor teeth with each of the sounds attempted, which would act as very frequent intermittent pressures. Speech students have noted that children with dental malfunctions and speech defects mispronounce the sounds of "s," "z," and "th."[13]

Other sounds difficult for children with dental malfunctions include "x," "f," "v," "b," and "m."[13] It is seen that these sounds are produced chiefly

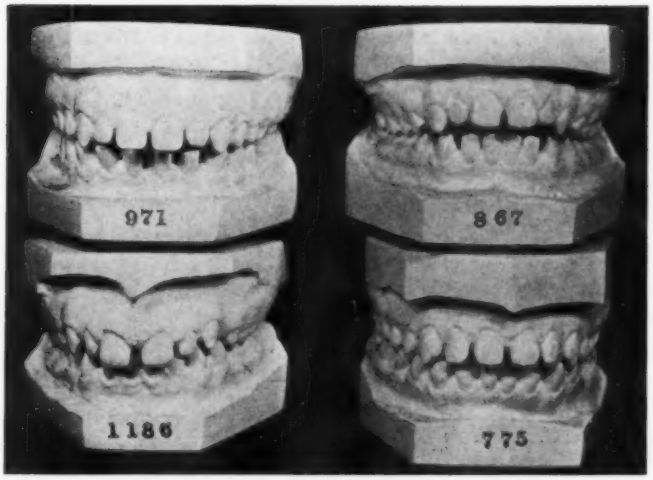


Fig. 6.—Models exhibiting the results of macroglossic conditions.

Fig. 7.

Fig. 8.

Fig. 7.—A buccal open-bite condition with the tongue in position.
Fig. 8.—An anterior and unilateral buccal open-bite condition with the tongue in position. The patient has defective speech.

by the lip rather than by the action of the tongue, yet the tongue should be resting with its tip against the lingual surfaces of the mandibular incisors. This tongue action is not of motion but rather of a fixed, relaxed position. If, in a speech defective individual, however, the tongue is held in a faulty position away from the lingual surfaces of the mandibular teeth, the pressure of the labial musculature chiefly the orbicularis oris and the mentalis muscles,

Fig. 9.—Models exhibiting mandibular incisors in retroversion.

could aid in the lingual tipping of the incisors (Fig. 9). At present a study is being made at Western Reserve University which will, upon its completion, shed much light, it is hoped, upon the relationship of speech inperfections causing dental malfunctions.

Mouth breathers have long been to exhibit a classical type of dental malfunction, usually Class II, Division 1 (Angle) malocclusion. It is interesting to note that the maxilla is elongated and contracted with an associated narrow, high vault. It has been said that the height of the position of normal tongues is controlled by the vault of the maxilla.[12] It surely appears to be a possibility that, in a normal mouth, normal tongue position contributes to normal development of the maxilla. If the tongue must be held low in mouth breathing, this could allow the buccal musculature, particularly the buccinator muscle, to act unopposed to maintain a narrow maxilla by arresting the growth laterally. Clinically there occasionally is seen a neutroclusion patient with dental mal-

function who has a mouth-breathing habit or condition. The picture is that of bilateral buccal cross-bites, nearly normal incisor relationship, and partially erupted maxillary canine teeth (Fig. 10). The mandible is apparently normal and the mandibular teeth do not appear to have any irregularities. The evidence seems to indicate that, since the tongue could not assume a normal position against the palate, the maxilla did not grow laterally and a dental malfunction resulted.

A study previously mentioned found that 35 per cent of dentitions studied showed the tongue at rest in one of four basic retracted positions.[14] Another study found very marked distal tongue position in 3 per cent of many cases studied and these had a micrognathic condition.[15] A downward and backward tongue position might be the cause or the result of micrognathia in those

Fig. 10.—Bilateral cross-bite with nearly normal incisor relationships; maxillary canine teeth in infraversion.

cases studied in the latter case. A serious investigation could possibly show that these retracted tongue positions could be cause rather than result; therefore, it may be proved that there is an association with retracted tongue position and distoclusion dental malfunction. In all four types of retraction discussed, the tongue assumes a position away from the lingual surfaces of the mandibular incisor teeth, allowing the labial musculature to act unopposed against those teeth. Crowded mandibular incisors, tipped lingually or rotated, excessive overclosure, and distoclusion should be the clinical picture if such is the case, and certainly there is an abundance of just such dental malfunctions. It has been said that a microglossic tongue may contribute to crowded arches. Perhaps microglossia and a retracted tongue are related, if not the same thing.

Probably the rest position is the most important tongue position as a problem for the orthodontist. It is not inconceivable that a correction of a dental malfunction such as just has been described would not include the correction of a retracted tongue. Then, upon release from retention, the mandibular incisors tend to relapse, probably from pressure from the labial musculature, with subsequent disappointment to patient, parent, and orthodontist. Certainly, observation of the tongue position could indicate the

presence of a retracted position and, if no method of treating the tongue to normal is evolved, it would indicate a substantiation for treatment including extraction of permanent teeth. An effort is made to bring the incisor teeth back to the retracted tongue. Perhaps this is another reason why so many extraction cases are stable upon completion. A balance must have been established between the tongue and the labial and buccal musculature. Could this account partially for the fact that some mandibular incisors are stable at an 85-degree angle of inclination to the mandibular plane, while others are stable at 95 degrees, as well as some unaccountable results with greater variation? It certainly seems that there is sufficient reason to believe that the tongue may have something to do with it. Does the tongue in proper position and function maintain an equilibrium against the labial musculature that has the stability of the denture as a result? Clinical evidence indicates that in successful cases, upon completion of treatment, the tongue is in a normal position and function. Furthermore, many cases that may be deemed relapses, after what appeared to be successful orthodontic treatment, do not appear to have normal tongue positions. This clinical evidence does present at the least a rather strong case for more thorough evaluation of the tongue, its positions, its effect on teeth, its effect on bony structure, and related musculature. It is very probable that prognosis of many cases can be greatly aided by knowledge and study of the tongue.

CONCLUSIONS

All of us are able to remember that when we were children the family physician was called when we were ill. He invariably opened his mysterious black satchel, took out a flat piece of wood, and said,

"Open your mouth, stick your tongue out, and say, 'Ah'!"

The focusing of a primary nature upon the tongue by the physician was not intended to be related to orthodontics, but it perhaps indicates a procedure of which all orthodontists could and should take heed.

Tongue thrusts have long been known by orthodontists to create or maintain buccal or anterior open-bite conditions.

Macroglossia has been recognized, as well, as a severe problem for the orthodontist to attempt to treat with any degree of certainty of result.

The multiple tongue acrobatics of perverted nature found in speech defective individuals tend to maintain, if not create, certain types of dental malfunction.

Mouth breathing patients exhibit specific dental malfunctions in which a primary factor is the depressed position of the tongue which allows uninhibited or unopposed action of the buccal tissues, chiefly the buccinator muscle, with a resulting lateral arrest of growth of the maxilla.

A retracted tongue position has been shown to exist in about 35 per cent of patients, a small portion of whom may be micrognathic. With the tongue away from the lingual surfaces of the incisor teeth, the labial musculature is unopposed and free to retract these teeth, before or after orthodontic treatment.

A normal oral relationship has a normal relationship of all the oral structures, including the tongue; and orthodontically corrected dental functions that are successful exhibit normal relationship of the oral structures, including the tongue.

Oral malrelationship has abnormal relationships of oral structures and frequently exhibits faulty tongue function or position; orthodontic failures frequently exhibit faulty tongue positions or function.

Whether improper tongue position or function is a complete cause or a contributing cause, dental malfunctions exhibiting a tongue problem are more frequently found than has been previously indicated.

Successful orthodontic treatment can be accomplished only if all oral structures are considered in the etiological study, treatment planning, and therapy. The tongue certainly must be included in any such attempt.

REFERENCES

1. Morris, H.: Human Anatomy, ed. 10, 1942, Philadelphia, The Blakiston Company, p. 1252.
2. Morris, H.: Human Anatomy, ed. 10, 1942, Philadelphia, The Blakiston Company, p. 1255.
3. Morris, H.: Human Anatomy, ed. 10, 1942, Philadelphia, The Blakiston Company, p. 1256.
4. Morris, H.: Human Anatomy, ed. 10, 1942, Philadelphia, The Blakiston Company, p. 1257.
5. Dewey, M., and Anderson, G. M.: Practical Orthodontics, ed. 6, St. Louis, 1942, The C. V. Mosby Company, pp. 127-128.
6. Capon, R. G.: Glossoptosis and Micrognathia, D. Record. **66**: 57-63, 1946.
7. Morris, H.: Human Anatomy, ed. 10, Philadelphia, The Blakiston Company, pp. 1256-1257.
8. Salzmann, J. A.: Principles of Orthodontics, ed. 2, Philadelphia, 1950, J. B. Lippincott Company, pp. 51, 99, 153.
9. Strang, R. H. W.: Textbook of Orthodontics, ed. 2, Philadelphia, 1943, Lea & Febiger, pp. 63-64.
10. Salzmann, J. A.: Principles of Orthodontics, ed. 2, Philadelphia, 1950, J. B. Lippincott Company, pp. 153-156.
11. Kessler, H. E.: Speech Factors in Dentistry, Oral Hyg. **41**: 649-652, 1951.
12. Wright, C. R., Mayskens, J. H., Strong, L. H., Westerman, K. N., Kingery, R. H., and Williams, S. T.: A Study of the Tongue and Its Relation to Denture Stability, J. Am. Dent. A. **39**: 269-275, 1949.
13. Kessler, H. E.: The Speech of Your Young Dental Patients, D. Survey **27**: 1094, 1951.
14. Wright, C. R., Mayskens, J. H., Strong, L. H., Westerman, K. N., Kingery, R. H., and Williams, S. T.: A Study of the Tongue and Its Relation to Denture Stability, J. Am. Dent. A. **39**: 270-271, 1949.
15. Capon, R. G.: Glossoptosis and Micrognathia, D. Record **66**: 62, 1946.
16. McCoy, J. D.: Applied Orthodontics, ed. 5, Philadelphia, 1941, Lea & Febiger, pp. 65-66.
17. McCoy, J. D.: Applied Orthodontics, ed. 5, Philadelphia, 1941, Lea & Febiger, p. 66.

Reports

REPORT OF THE RESEARCH COMMITTEE, AMERICAN ASSOCIATION OF ORTHODONTISTS

THIRTEEN essays representing research investigations of unusually high caliber were submitted in the Prize Essay Contest this year. A list of the titles, authors, and institutions, and the results of the judging is attached to this report.

A large number of abstracts to be read at the annual meeting were submitted to Dr. Thomas Speidel. Dr. Speidel arranged the abstracts according to subject matter, rather than by institutions, for presentation. The abstracts covered a broad field of investigation in many of the basic problems in orthodontics.

The Committee believes that the recipients of the first prize award and the two honorable mentions should be given a suitable certificate signifying their achievements. In all probability, the initial expense for such a certificate and the preparation of certificates for the past recipients would not exceed $200.00. The yearly expense after the initial certificate form has been prepared should not exceed $25.00.

The Committee suggests that Dr. J. William Adams, Indianapolis, Indiana, be appointed as the new member on the Committee. Dr. Jack Salzmann was elected as the chairman, even though he had served previously in this capacity. This will make it possible for the senior member always to serve as the chairman, and this seems to be a logical procedure. The retiring member this year is the chairman, Dr. John R. Thompson.

Respectfully submitted,
JOHN R. THOMPSON

RESEARCH ESSAY CONTEST OF THE AMERICAN ASSOCIATION OF ORTHODONTISTS

PRIZE-WINNING ESSAY

The Integration of Facial Skeletal Variants: A Serial Cephalometric Roentgenographic Analysis of Craniofacial Form and Growth. S. Eugene Coben, D.D.S., M.S.

Research was done in the Department of Orthodontics, College of Dentistry, University of Illinois, Chicago, Illinois. Dr. Coben completed his graduate orthodontic training at the University of Illinois in 1952. He graduated from Temple University Dental School in 1949.

HONORABLE MENTION

Width of the Nasopharynx and Related Anatomical Structures in Normal and Unoperated Cleft Palate Children. Jacob D. Subtelny, D.D.S., M.S.

Research was done in the Department of Orthodontics and Cleft Palate Training Center at the University of Illinois, Chicago, Illinois.

A Roentgenographic Investigation of the Effect of Orthodontic Treatment on the Relationship of the Alveolar Bone Proper to the Cemento-Enamel Junction. Donald Hodgkins Baxter, D.D.S., M.S.

Research was done in the Department of Orthodontics, University of Washington, Seattle, Washington.

THE ANNUAL REPORT OF THE PUBLIC RELATIONS COMMITTEE OF THE AMERICAN ASSOCIATION OF ORTHODONTISTS, 1954

DURING the past year there have been no complaints filed through the Public Relations Committee which have merited channeling to the Federal Trade Commission pertaining to, or taking exception to, unfair advertising appearing in various trade journals relative to the practice of orthodontia.

Your Committee, however, would like to call your attention to the fact that at the annual meeting which was held in Dallas, Texas, April 26 through 30, 1953, the American Association of Orthodontists, its officers, directors, and members, and T. Wallace Sorrels have agreed that they will not directly, or indirectly, in or in connection with the offering for sale, sale or distribution in commerce, between and among the several states of the United States, and in the District of Columbia, of supplies, devices, and appliances used by dentists in the practice of orthodontia, do any of the following acts:

> A. Attempt to prevent or prevent manufacturers or sellers of supplies, devices, and appliances used by dentists and orthodontists in the practice of orthodontia from having access to media of advertising serving the dental profession or
>
> B. Attempting to prevent or preventing dentists from having the benefit of advertising by those engaged in the manufacture or sale of supplies, devices and appliances needed by dentists in the practice of orthodontia or
>
> C. Attempting to coerce or coercing publishers and editors of trade publications in the dental field, or others, from soliciting or publishing advertisements from those engaged in the manufacture and sale of supplies, devices and appliances used by dentists in the practice of orthodontia, or
>
> D. Using the American Association of Orthodontists or any successor thereto as an instrumentality or medium for carrying on and making effective any of the aforesaid acts.

The word *orthodontia* has been limited to the regulation of teeth through use in the oral cavity of certain supplies, devices, and appliances. This could be boiled down by saying that the American Association of Orthodontists and its officers, directors, and members have agreed not to interfere with advertising by manufacturers or sellers of supplies, devices, and appliances needed by dentists in the practice of orthodontia. You will remember that we were careful to use the terms *supplies, devices,* and *appliances,* since we argued to the Federal Trade Commission that we did not believe that we should agree or be ordered to refrain from attempting to protect the public from unskilled attempts at the practice of orthodontia by mail-order prescriptions and, therefore, have not cut ourselves off from the opportunity to take exception to advertisements of the practice of orthodontia by mail. If any member wishes to take exception he will file his complaint with the Chairman of the Public Relations Committee. If this is deemed a justifiable complaint, he is turn will contact the Federal Trade Commission rather than the advertiser or publisher.

Your Committee has written a booklet entitled "Educational Requirements for Dental and Orthodontic Training." This booklet was published April 20, 1954. The American Board of Orthodontics granted your Committee the privilege of using any of the material in its files pertaining to dental and orthodontic information for inquiring students or orthodontists who might be desirous of obtaining a certificate which is granted upon examination to qualified individuals by the American Board of Orthodontics.

Your Committee recommends that this booklet be accepted as official information of the American Association of Orthodontists.

Respectfully submitted,

RICHARD SMITH
FRANK P. BOWYER
FREDERICK R. ALDRICH, Chairman
Public Relations Committee

EDUCATIONAL REQUIREMENTS FOR DENTAL AND ORTHODONTIC TRAINING*

This booklet's primary aim is to present to the inquirer of orthodontic training a brief outline of the educational requirements pursuant to becoming a qualified member of the orthodontic branch of the dental profession. It also includes a résumé of the requirements for obtaining a certificate which is granted by the American Board of Orthodontics.

First, the individual must have a diploma or equivalent from a high school, or secondary school, before he can enter pre-dental training. It is extremely important that high school students realize, in selecting a college, what is required in pre-dental training. Before one can make application to any dental school, he must have two years' pre-dental college credit in the following subjects: a modern language, English, and the following basic sciences: general chemistry, qualitative chemistry, physiological chemistry, organic chemistry, and one year of college physics, comparative anatomy, biology, and zoology. Upon completion of the pre-dental course, he then will be required to take an aptitude test given by the Council on Dental Education of the American Dental Association. All applicants meeting other requirements for admission into the curriculum of the College of Dentistry are required to take this test, the results of which are considered in conjunction with their other qualifications. This test may be taken at any one of forty-odd dental schools throughout the United States and Canada at specified times during the year preceding the date on which the applicant expects to enter the College of Dentistry. The following is a list of forty-some dental schools situated in the United States:

Alabama, Birmingham	University of Alabama
California, Los Angeles	University of Southern California
California, Loma Linda	School of Evangelists
California, San Francisco	College of Physicians and Surgeons, University of California
Washington, D. C.	Georgetown University
Georgia, Atlanta	Emory University
Illinois, Chicago	Chicago College of Dental Surgery, Northwestern University University of Illinois
Indiana, Indianapolis	Indiana University
Iowa, Iowa City	State University of Iowa
Kentucky, Louisville	University of Louisville
Louisiana, New Orleans	Loyola University
Maryland, Baltimore	University of Maryland
Massachusetts, Boston	Harvard University, Tufts College
Michigan, Detroit	University of Detroit, University of Michigan
Minnesota, Minneapolis	University of Minnesota
Missouri, Kansas City	University of Kansas City
Missouri, St. Louis	St. Louis University, Washington University
Nebraska, Omaha	Creighton University
Nebraska, Lincoln	University of Nebraska
New York, New York	Columbia University, New York University
New York, Buffalo	University of Buffalo
North Carolina, Chapel Hill	University of North Carolina
Ohio, Columbus	Ohio State University
Ohio, Cleveland	Western Reserve

*Booklet published by the Public Relations Committee of the American Association of Orthodontists.

Oregon, Portland----------University of Oregon
Pennsylvania, Philadelphia----------Temple University, University of Pennsylvania
Pennsylvania, Pittsburgh----------University of Pittsburgh
Tennessee, Nashville----------Meharry Medical College
Tennessee, Memphis----------University of Tennessee
Texas, Dallas----------Baylor University
Texas, Houston----------University of Texas
Virginia, Richmond----------Medical College of Virginia
Washington, Seattle----------University of Washington
West Virginia, Morgantown----------West Virginia University
Wisconsin, Milwaukee----------Marquette University

The five dental schools in Canada are:

Alberta, Edmonton----------University of Alberta
Nova Scotia, Halifax----------Dal Housie
Quebec, Montreal----------McGill University of Montreal
Toronto----------University of Toronto

The second phase of education should be considered the under-graduate dental training which consists of four years' training in one of the above-mentioned dental schools. The technical training that is necessary for the student while attending dental school has been purposely omitted. After successfullly completing the four years of under-graduate dental study, the student will receive a diploma, D.D.S., or D.M.D., from the school in which he takes his training. This entitles him to make application for his State Board examination in the state that he has selected to practice dentistry.

At this point, if the dentist wishes to specialize in Orthodontics, the following schools offer training in this field of specialization:

California----------University of Southern California
Georgia----------Emory University
Illinois----------Northwestern University, University of Illinois, Loyola University, Chicago
Indiana----------Indiana University
Iowa----------University of Iowa
Massachusetts----------Tufts College
Michigan----------University of Michigan
Minnesota----------University of Minnesota
Missouri----------St. Louis University, University of Kansas City, Washington University
New York----------University of Buffalo, Columbia University, New York University
North Carolina----------University of North Carolina
Ohio----------Ohio State University
Pennsylvania----------University of Pennsylvania, University of Pittsburgh
Tennessee----------University of Tennessee
Washington----------University of Washington
Canada----------University of Montreal, University of Toronto

Upon completion of the formal post-graduate curriculum in Orthodontics, the fourth phase consists of specialized training that the orthodontist must undergo to be certified by the American Board of Orthodontics. This certificate was created by the American Society of Orthodontists in 1929.

The purpose of the certificate, as set up by the American Board of Orthodontics, is as follows:

First. To stimulate and keep alive the spirit of research and self-improvement among students and practitioners of orthodontics.

Second. To establish the competence of specialists to practice orthodontics.

Third. To arrange, control, and conduct examinations for the purpose of testing the qualifications of orthodontists and to confer certificates upon those who meet the established requirements of the Board.

The certificates granted by the Board are in no sense degrees, nor do they purport to confer upon any person any legal qualifications, privilege, or license to practice orthodontics, nor does the Board intend to limit the activities of any licensed dentist. All Diplomates are required to understand and agree that titles to Certificates are retained by

The Board of Orthodontics, and that such Certificates shall be surrendered upon demand by order of the Board, if and whenever the Board deems such action to be in the best interests of professional and public welfare.

First, it will establish in the mind of the holder the assurance that he is maintaining accredited standards of competence in his practice.

Second, educational or social institutions, in which the services of an orthodontist may be required, will learn to discriminate standards of fitness in the practice of orthodontics, and will be influenced by the certificate of the American Board of Orthodontics in arriving at conclusions.

Furthermore, the establishment of definite standards of fitness to those anticipating specialization in orthodontics will serve as a genuine stimulus to desire and possess such a symbol of recognition of their ability.

Lists of those holding certificates will be published by the Board from time to time.

Who may apply for a Certificate? At this point if the orthodontist, or orthodontic student, is interested in qualifying for a certificate, he should write the Secretary of the American Board of Orthodontics for further instructions.

Published April 20, 1954.

REPORT OF EDUCATION COMMITTEE, AMERICAN ASSOCIATION OF ORTHODONTISTS, 1954

THE Education Committee of your Association last year devoted its efforts to determining how many schools were offering advanced work in orthodontics and to gathering other pertinent data pertaining to such work. At the time of the last annual meeting the Committee members were not satisfied with the results they had obtained and suggested that it be expanded and continued by the present Committee.

According to this suggestion, your present Committee sent questionnaires to all dental schools in the United States and Canada. This questionnaire, a copy of which is appended to this report, was designed to gather data on a number of questions not covered by the former one, as well as to determine whether there were any additions to the list of schools offering orthodontics. Forty-eight were sent out and forty-three were returned.

Of the forty-three questionnaires returned, sixteen stated that they offered no advanced work in orthodontics and one, the University of California, offers only an honors course for its own students at the third and fourth undergraduate year levels. These schools, therefore, were not felt to be subjects for the purposes of the scrutiny.

It would appear from the reports of the remaining twenty-six schools that, with the exception of certain details of organization, degrees or certificates granted, and so forth, all are following a rather similar plan. There is still some confusion regarding graduate and postgraduate degrees, but the questionnaire was designed in such a way as to make possible a better interpretation of the actual meaning. It asked specifically whether the work was organized under the college of dentistry or under the graduate college of the university. If under the first alone, it was classified as postgraduate, while under the second it was graduate.

Of the twenty-six schools offering advanced work, sixteen offer courses leading to the M.S. or the M.S.D. degree, where that course is administered by the graduate college. One school offers the work under a teaching fellowship plan, and nine award certificates of proficiency.

The majority of schools require full-time residence, although there are a few that permit part-time work. Residence is usually of eighteen months' minimum, although two schools require only fifteen months. Six require sixteen months, and one requires seventeen months. At the other extreme is one which requires twenty-four months.

DATA OBTAINED FROM QUESTIONNAIRES

INSTITUTION	GRADUATE	POST-GRADUATE	RESIDENCE: FULL TIME (MONTHS)	RESIDENCE: PART TIME	DEGREE CONFERRED	CERTIFICATE	COURSE BEGINS	AVERAGE NUMBER OF STUDENTS
University of Alabama	X		24		M.S. in Dentistry		Annually September	Just starting
University of Buffalo		X	16			X	Annually	4
Columbia University		X	16			X	Annually September	22
Emory University		X	24			X	Annually July	1
University of Illinois	X		18		M.S.	X	Annually September	10
Indiana University	X		18		M.S.		Annually September	3
University of Iowa	X		17		M.S.		Annually	5
University of Kansas City		X	18		M.S.D.	X	Annually July	4
Loyola (Chicago)		X	18			X	Annually July	Just starting
University of Michigan	X		21		M.S.		Annually September	5 to 7
University of Minnesota	X		21		M.S.D.		Annually	2
University of Montreal		X	16			X	Annually September	5
New York University		X	44 (9-hr. wk.)			X	Annually	12
University of North Carolina	X		15 to 18		M.S. M.S. in Orthodontics	X	Annually June	5
Northwestern University	X		15		M.S. or M.S.D.		Annually	8
Ohio State University	X		18	24 mos. (3-day week)	M.D.S.		Annually September	13
University of Pennsylvania	X		28		M.D.S.	X 16 mos.	Annually September	10
University of Pittsburgh	X		21 or 60%		M.S.		Annually September	6
St. Louis University	X		21		M.S.		Each 21 months	5
University of Tennessee		X	18		M.S. in Ortho.		Annually July and Jan.	6
University of Toronto	X		16		M.Sc.D.	or diploma in Ortho.	Annually September	4
Tufts College	X		16		M.S. M.S.D.	X	Each 16 months	10
Washington University	X		21 or 66%		M.S.		Annually	2
University of Washington	X		18		M.S.D.	X	Annually September	10

Of greatest interest to your Committee was the rapid increase in the number of schools offering advanced work in orthodontics and the consequent increase in the opportunities for training. If all available places were filled, the number of new men entering the specialty each year would be between 160 and 170.

The data pertaining to individual schools are appended to this report.

Respectfully submitted,
ALLAN G. BRODIE, Chairman

LETTER AND QUESTIONNAIRE SENT TO FORTY-EIGHT DENTAL SCHOOLS

February 15, 1954

In the December number of the AMERICAN JOURNAL OF ORTHODONTICS there appeared a listing of the courses in postgraduate and graduate work in orthodontics now given in the various dental schools. It sets forth the minimum residence requirements, and the type of recognition given for successful completion of the course. This listing has been reviewed by several people and certain errors have been found.

The Committee on Education of the American Association of Orthodontists is charged with the task of keeping these lists up to date and accurate. As Chairman of the Committee, I am writing to you to ask your cooperation in this task.

The enclosed questionnaire would give most of the pertinent information sought, but you are urged to add any other details that are peculiar to your own organization. Space has been added for this purpose. If you do not offer advanced work in orthodontics, a note to that effect at the bottom of the questionnaire will be sufficient.

I hope that this will not impose too much labor on your part and that you will be able to give it your prompt attention.

Sincerely yours,
ALLAN G. BRODIE
Chairman, Committee on Education

AGB:bf

P.S. Please address your replies to 808 South Wood St., Chicago 12, Illinois.

SURVEY OF ORTHODONTIC TRAINING OFFERED BY AMERICAN UNIVERSITIES

NAME OF UNIVERSITY _____

HEAD OF ORTHODONTIC DEPARTMENT _____

DEGREES HELD BY HEAD OF DEPARTMENT _____

IS COURSE ORGANIZED UNDER

a. Graduate School or College? _____

b. Dental School Faculty? _____

c. Postgraduate or Extension Division? _____

DO ORTHODONTIC TEACHERS HOLD DENTAL SCHOOL APPOINTMENTS? _____

GRADUATE SCHOOL APPOINTMENTS? _____

WHAT IS THE MINIMUM RESIDENCE TIME REQUIRED FOR THE COURSE IN MONTHS? _____

IS FULL-TIME RESIDENCE REQUIRED? _____

IF PART-TIME, WHAT PERCENTAGE? _____

WHAT RECOGNITION IS GIVEN FOR SUCCESSFUL COMPLETION OF COURSE?

a. Graduate School degree (M.S., Ph.D.) _____

b. Postgraduate degree (M.S.D.) _____

c. Certificate _____

IF GRADUATE DEGREE IS CONFERRED, HOW MANY UNITS ARE REQUIRED? _____ THESIS? _____

ARE FINAL EXAMINATIONS HELD? _____

BY WHOM ARE THEY CONDUCTED? _____

AT WHAT INTERVALS ARE NEW CLASSES STARTED? _____

AVERAGE SIZE OF CLASS FOR LAST THREE YEARS _____

(Please use reverse side for comments and explanations not covered above.)

In Memoriam

Vernon Leslie Hunt

1893-1954

VERNON HUNT of Eureka, California, lost his life Sept. 5, 1954, while fishing on the Klamath River with two companions, who were also drowned.

Dr. Hunt, who at the time of his death was vice-president of the Pacific Coast Society of Orthodontists, was born 61 years ago in Arcata, California. He was graduated from the College of Physicians and Surgeons in San Francisco in 1916, and served as president of the school's alumni association.

He had occupied all the offices of the Humboldt County Dental Society. For fifteen years he served as a councilman from his district to the California State Dental Association, of which he was a past president. He also served as the California State Dental Association's delegate to the American Dental Association, in which body he had been a member of the Education Committee. He was vice-president and consultant of the American Association of Dental Examiners and chairman of the Foundation Committee of that organization. He was a Fellow of the American College of Dentists and of the International College of Dentists. He was a member of Psi Omega Dental Fraternity, Tau Kappa Omega, college undergraduate honor society, and Omicron Kappa Upsilon, national dental honor society.

Perhaps his most outstanding achievement was his work on the California State Board of Dental Examiners, which is the keystone in the enforcement and protection of the State Dental Practice Act. Among his contributions to his profession was his technique for the examination of candidates for licensure in the State of California.

He had lectured and conducted clinics before numerous dental organizations. His favorite, and perhaps most widely acclaimed, subject of lectures dealt with economics, practice management, investments, etc., and was based on knowledge gained from his past long experiences in finance. He had published articles which appeared in the AMERICAN JOURNAL OF ORTHODONTICS, the *Journal of the California State Dental Association,* the *Journal of the American Dental Association,* and the *American Weekly.*

Dr. Hunt is survived by his widow, Mrs. Eva Hunt; his son, Dr. Everett Hunt; three grandchildren; two sisters; and four brothers.

Department of Orthodontic Abstracts and Reviews

Edited by

DR. J. A. SALZMANN, NEW YORK CITY

All communications concerning further information about abstracted material and the acceptance of articles or books for consideration in this department should be addressed to Dr. J. A. Salzmann, 654 Madison Avenue, New York City

The Adaptive Chin: By E. Lloyd DuBrul, M.S., D.D.S., Assistant Professor In Charge of Oral Anatomy, College of Dentistry, University of Illinois, Chicago, Illinois, and Harry Sicher, M.D., D.S.C., Professor of Anatomy and Head of Department, Loyola University School of Dentistry, Guest Lecturer, Northwestern University Dental School, Chicago, Illinois. 97 pages Illustrated. Springfield, Ill., Charles C Thomas, 1954.

This publication is one of the monographs of the American Lecture Series dealing with anatomy, edited by Otto F. Kampmeier, formerly Professor of Anatomy at the University of Illinois. In this monograph the attempt is made to tell "what the chin really *is* and what it *is not*." All romantic theories with respect to the prominence of the chin in man notwithstanding, the authors point out that "The chin is but a blob of bone." Furthermore, they state that the chin seems to be an adaptation to the retrogressive process which the skull is undergoing.

A historical account is given of the various theories on the formation of the human chin and critical appraisal is made of these theories. The method of presenting the subject may at first prove irksome to the reader. The historical and critical reviews are not set forth in the usual "catalogue" manner, but it is as if the authors build up "straw men" only to knock them down by the bolts of their criticism. It is after the first thirty pages of this book of less than 100 pages that they get down to brass tacks and deal with the facts as they understand them. It is only then that we appreciate their discoursive method of presentation.

Four main theories of the origin of the human chin are channelized from the plethora of theories and notions that have been brought into the literature on the subject. These are classified by the authors as: (1) the shifting theory of Bolk, which claims that the chin is the result of a forward and backward shifting relationship between the dental and basilar elements of the mandible; (2) the effects of speech, as claimed by Walkhoff and Robinson; (3) the mechanical effects of the reduction and retrusion of the teeth, as proposed by Weidenreich; and (4) the effects of muscular activity, as shown by H. Virchow, van den Broek, and Bluntschli.

Any study of the chin cannot be fully based on the mandible alone. The entire skull must be taken into consideration. A composite of primate skulls extending to man, the authors state, would show an ever-increasing vault of the cranial dorsum, and augmentation of the neurocranial-facial axes, a reduction and retrusion of the snout and jaws, a ventral migration of the fora-

men magnum, plus a change from an internally concave to a convex cranial base. All of the foregoing evolutionary changes are intimately connected with the assuming by man of his vertical posture and mode of locomotion.

Correlated with these changes will be found an increase in face height. Finally, the original elongated rectangular mass of the skull will be found to have a vertically heightened spherical appearance. These changes also seem to accompany the adaptations of the mammalian skull to the erect posture.

As the snout and dentition retreat under the cranium and the foramen magnum and the occipital condyles come forward, the lower border of the jaw seems to expand peripherally while the angle between the jaw halves increases, so that the teeth, when viewed from the base of the mandible, are seen to be lingual in man as compared to those in the lower primates. While the foregoing is taking place, the whole symphyseal plate of the mandible swings from a procumbent position in the lower primates to a point beyond the vertical in man. In the meantime, the teeth have shifted backward and have become smaller in size and number.

The gonion angle of the mandible, in going from the lower primates to man, is found to be pushed forward as man assumes his characteristic posture. As the mandible increases in vertical height, it decreases in horizontal length. This shortening of the mandible swings the mandibular symphysis forward and, as the reduction in the size of the dentition takes place, the "mentium osseum" is established.

In addition to the phylogenetic changes in the skeleton, there are also muscular changes, especially those of the external pterygoid, which are responsible for added stress and consequent strengthening of the mandibular symphysis leading to emphasis in the formation of the chin.

An accompanying phenomenon of the foregoing skeletal and muscular changes and the assumption of the upright posture in man are the changes in the temporomandibular joint which progresses from a simple hinge to that of a forward gliding movement of the mandibular condyles. Thus, posture, bone change, muscular activity, diet, physiologic demand, and neurogenic change are intimately related in the evolutionary emergence of the chin in man.

A crystal-clear explanation of the function of the external condyles which exert a braking action in closure of the mandible is given and the force which these muscles exert on the mandibular symphysis is explained. To demonstrate more graphically the force exerted on the mandibular symphysis, the authors employed the "Stresscoat" method which is described in the text.

The theory on the formation of the human chin is shown by the authors to hold in lower animals such as pikas (Ochotonidae) when compared to hares when the latter are wont to assume the erect posture. Examples are also cited in carnivora (bears) to demonstrate the absence of the chin where the snout remains constant in length.

To the practicing orthodontist this little volume is an important adjunct because it will enable him to understand not only the origin and development of the chin but also the part played by the muscles most concerned in jaw movement in the molding of the jaws. It will also give the orthodontist a valuable clue to the intimate relation between jaw size, malocclusion, and successful tooth alignment. The authors deserve the thanks of those who are not essentially anatomists or comparative physical anthropologists for a succinct, authoritative presentation of a subject too long shrouded by the mist of confusing theories.

J. A. S.

News and Notes

American Association of Orthodontists
51st Annual Meeting

SAN FRANCISCO AWAITS YOU

Why does one convention after another come to San Francisco? Here are the reasons:

A ride on one of our beloved cable cars to Fisherman's Wharf for a delicious seafood dinner; a sightseeing boat tour of San Francisco Bay with its 452 miles of landlocked harbor; a breath-taking view from Telegraph Hill or the "Top of the Mark"; our International Settlement, yesteryear's Barbary Coast; the fascinating shops in our romantic old-world Chinatown; our gigantic and colorful Golden Gate Park, with a sip of tea amid the oriental splendor of the Japanese Tea Garden; a trip across the Golden Gate Bridge to Muir Woods with its towering age-old redwoods. The ladies, especially, will want to tour world-renowned Gump's with its objects of art from the world over and many more scenic delights too numerous to mention.

We'll be expecting you!

1955 Prize Essay Contest, American Association of Orthodontists

Eligibility.—Any member of the American Association of Orthodontists and any person affiliated with a recognized institution in the field of dentistry as a teacher, researcher, undergraduate, or graduate student shall be eligible to enter the competition.

Character of Essay.—Each essay submitted must represent an original investigation and contain some new significant material of value to the art of science of orthodontics.

Prize.—A cash prize of $500.00 is offered for the essay judged to be the winner. The committee, however, reserves the right to omit the award if, in its judgment, none of the entries is considered to be worthy. Honorable mention will be awarded to those authors taking second and third places. The first three papers will become the property of the American Association of Orthodontists and will be published. All other essays will be returned.

Specifications.—All essays must be in English, typewritten on 8½ by 11 inch white paper, double spaced with at least 1 inch margins. Each sheet must be numbered and bound or assembled with paper fasteners in a "brief cover" so that they may be handled easily. Three complete copies of each essay, including all illustrations, tables, and bibliography must be submitted. The name and address of the author must not appear in the essay. For purpose of identification, the author's name, together with a brief biographical sketch which sets forth his or her dental and/or orthodontic training, present activity, and status (practitioner, teacher, student, research worker, etc.) should be typed on a seperate sheet of paper and enclosed in a sealed envelope. The envelope should carry the title of the essay.

Presentation.—The author of the winning essay will be invited to present it at the meeting of the American Association of Orthodontists to be held at the Fairmont Hotel, San Francisco, California, the week of May 9, 1955.

Judges.—The entries will be judged by the Research Committee of the American Association of Orthodontists.

Final Submission Date.—No essay will be considered for this competition unless received in triplicate at the following address on or before Feb. 15, 1955: Dr. Alton W. Moore, Medical Dental Building, Seattle, Washington.

J. A. Salzmann, Chairman, Research Committee
American Association of Orthodontists
654 Madison Ave.
New York 21, N. Y.

American Association of Orthodontists, 1955 Research Section Meeting

Continuing the policy of recent years, the program will consist of a series of ten-minute research reports which may be presented orally or read by title only. All persons engaged in research are urged to participate in this program which will be held Wednesday afternoon, May 11, 1955, in the Fairmont Hotel, San Francisco, California.

Each participant is asked to prepare a 250-word abstract for publication in the AMERICAN JOURNAL OF ORTHODONTICS. Abstract for publication and the ten-minute oral presentation at the meeting should be carefully prepared to present an adequate description of the import of your investigation.

Forms for use in submitting the title and 250-word abstract of your research will be sent to each dental school orthodontic department and to any individual requesting one. Please send your title and abstract as early as possible, but not later than March 10, 1955, to Dr. Thomas D. Speidel, University of Minnesota, School of Dentistry, Minneapolis 14, Minnesota.

J. A. Salzmann, Chairman
Research Committee
American Association of Orthodontists
654 Madison Ave.
New York 21, N. Y.

American Board of Orthodontics

The next meeting of The American Board of Orthodontics will be held at the Fairmont Hotel in San Francisco, California, May 3 through May 7, 1955. Orthodontists who desire to be certified by the Board may obtain application blanks from the secretary, Dr. C. Edward Martinek, 661 Fisher Bldg., Detroit 2, Michigan.

Applications for acceptance at the San Francisco meeting, leading to stipulation of examination requirement for the following year, must be filed before March 1, 1955. To be eligible, an applicant must have been an active member of the American Association of Orthodontists for at least three years.

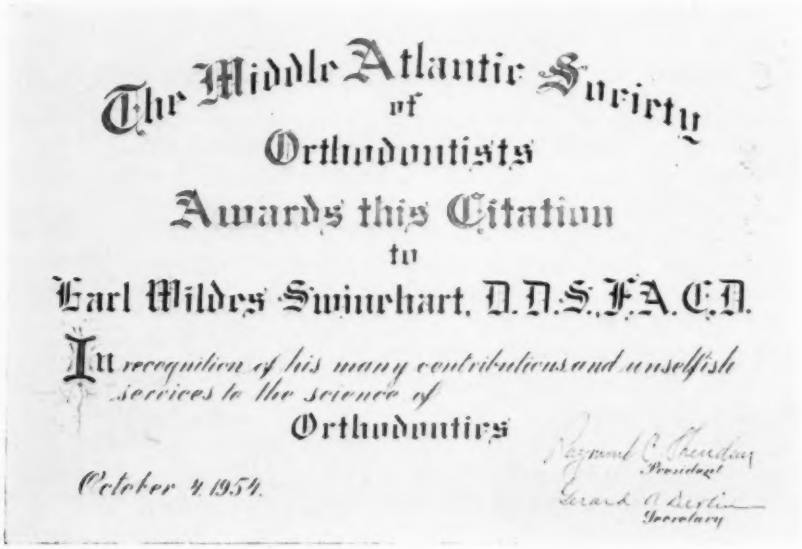
Luncheon in Honor of Andrew F. Jackson and Earl W. Swinehart

On Oct. 4, 1954, at its annual meeting in Atlantic City, the Middle Atlantic Society of Orthodontists presented citations to Andrew F. Jackson and Earl W. Swinehart at a luncheon in their honor. The following is a brief résumé of the achievements of Dr. Jackson and Dr. Swinehart.

In his fifty years of practice, most of it devoted to orthodontics, Dr. Jackson has contributed freely of his genius as teacher, lecturer, and clinician. It may be of interest to you to know something of the background of the man we are honoring. Andrew Jackson was born in Chile, of Scotch-English parents. At the age of 16 he was faced with the prospect of starting at the bottom and working his way up in some sort of business. He inquired into the possibilities of entering dental school in the United States, and when he discovered that entrance requirements then were for two years of high school or the equivalent, he set off for the North and college. Without overexerting himself, he finished third in a class of over 100.

After working for a dentist in Camden, New Jersey, for two years, he began practice for himself across the river in Philadelphia. Then, during the early days of World War I, Dr. William G. Law, on a visit to Philadelphia from Berlin, helped him start the treatment of a handful of orthodontic patients. In this way, the career of a new orthodontist was launched.

When a man has devoted a lifetime of service to his patients and to his fellow practitioners, it must be expected that we are not the first to pay tribute to him, and this


The Middle Atlantic Society of Orthodontists

Awards this Citation

to

Earl Wildes Swinehart, D.D.S., F.A.C.D.

In recognition of his many contributions and unselfish services to the science of Orthodontics

October 4 1954.

Raymond C. Thresher
President

Gerard A. Derlin
Secretary

Citation awarded to Dr. Earl W. Swinehart by the Middle Atlantic Society of Orthodontists. Dr. Andrew F. Jackson received a similar award.

expectation will be borne out by this partial list of honors awarded to Dr. Jackson: Honorary Diplomat in Dental Orthopaedics, Royal Faculty of Physicians and Surgeons of University of Glasgow; Honorary Fellow in Dental Surgery, Royal College of Surgeons of London; Honorary Member British Dental Association; Great Lakes Society of Orthodontists; Southwestern Society of Orthodontists; American Dental Society of Europe; Faculty—Dental School, University of Conception, Chile; Faculty—Dental School, University of Santiago, Chile; Odontologic Society of Lima Pęru; Sociedad Odontelogica of Valparaiso; Odontologica de Chile, Santiago, Chile; Sociedad Peruana de Orthodonticia, Lima, Peru; Sociedad Peruana de Protesis Dental y Maxilo Facial of Lima Peru; Orthodontic Society of El Salvador; Orthodontic Society of Mexico; Omicron Kappa Upsilon; Fellow, International College of Dentists; and Member of International Relations Committee.

When honors are bestowed upon a man to whom they are no novelty, the one that may mean the most is the one that comes from his closest associates and is not tendered for his scientific contributions, his work on committees, or his teaching alone, but one which says, "You are a respected and beloved friend."

There is nothing sentimental about our expression of high regard for Dr. Swinehart, for our recognition transcends that sort of compliment, nor are a lot of vacuous words used to make his service to the profession of dentistry and to the public outstanding. There is no need for that; over these many years he has well earned approbation.

Earl Wildes Swinehart was born in Adelphi, Ohio, where his ancestors had migrated from the eastern seaboard shortly after the American Revolution. Though agriculture was in his blood and he apparently has never been able to get it out, he also had a background of professional life to influence him, for his mother's father, grandfather, and brother were physicians, and dentistry became his chosen field through certain experiences with his own dental problems.

In 1899 Earl Swinehart entered the Ohio College of Dental Surgery, from which he was graduated in 1902, but prior to that it had been necessary for him to take a course in

pedagogy in order that he might teach school a while to earn money for his dental education. For five years he taught school, swept the floors, and made the fires, all of this stimulating a self-reliance which is most evident today. On graduation from dental school he was honored by his class by being selected to deliver the class address at commencement. Returning then to Adelphi, he started general dental practice, making use of the new anesthetic of the time (cocaine) for the extraction of teeth, and in short order he became exceptionally busy. Even with so much success in that field, he was observing the beneficial effects of orthodontic treatment and the progress being made under the influence of Edward H. Angle. He knew then what his future would be, so in 1909 he enrolled with Dr. Angle.

In 1914 Dr. Swinehart, after talking with Dr. Kelsey, began practice in Baltimore as an orthodontic specialist and, remembering his early days as a teacher, joined the faculty of the Baltimore College of Dental Surgery as demonstrator in orthodontics. Later, following the merger of the University Dental School and the College, he became Professor of Orthodontics in the resulting single institution.

Dr. Swinehart has worked assiduously for the improvement of our special field and for the whole dental profession, contributing clinics, case reports, papers, inventions (the band driver and the band remover), and a chapter on band technique for an orthodontics textbook.* He has written three papers in particular which have been of special advantage to the profession: "Pernicious Muscular Habits"; Structural and Nervous Effects of Thumb-Sucking"; and "Clinical Study of Open-Bite."

Dr. Swinehart's memberships are: American Dental Association; Maryland State Dental Association (past president); Baltimore City Dental Society; American Association of Orthodontists; Middle Atlantic Society of Orthodontists; European Society of Orthodontists; Northeastern Society of Orthodontists (non-resident); Washington-Baltimore Society of Orthodontists (past president); Eastern Association of Angle Graduates (past president); American College of Dentists (past regent and past president); Certificate, American Board of Orthodontics; Omicron Kappa Upsilon (honorary member); Psi Omega Dental Fraternity (honorary member).

Middle Atlantic Society of Orthodontists

The next meeting of the Middle Atlantic Society of Orthodontists will be held Oct. 23, 24, and 25, 1955, at the Shoreham Hotel, Washington, D. C.

Northeastern Society of Orthodontists

The next, or annual, meeting of the Northeastern Society of Orthodontists will be held at the Hotel Commodore, New York, N. Y., on Monday and Tuesday, March 7 and 8, 1955.

Pacific Coast Society of Orthodontists

The Northern component meets the second Tuesday of March, June, September, and December.

The Central component meets the second Tuesday of March, June, September and December.

The Southern component meets the second Friday of March, June, September, and December.

Northern Component

No meeting. Next meeting will be held November 1.

Central Component

Our fall meeting was called to order on Tuesday evening, Sept. 14, 1954, by Chairman Wendell Wylie at the Alexander Hamilton Hotel in San Francisco.

*Dewey, M., and Anderson, G. M.: Practical Orthodontics, St. Louis, 1935, The C. V. Mosby Company.

Eugene West gave a report on the Crippled Children Service in San Francisco, which was followed by a discussion. It was moved, seconded, and passed that his report be accepted.

Sam Glynn of Honolulu and Alan Cass of Palo Alto and Los Altos were voted in as regular members. Those who were elected to associate membership are: Robert Kemp, Fresno; Armando Riccardi, Reno; Wendell Cotton, Berkeley; Arthur Ponterio, Burlingame; Archie Peterson, Salinas; and Kenneth Hobson, San Carlos.

The speaker of the evening was Bill Parker, who gave a very interesting paper entitled "Death and the Orthodontist." His paper was presented through the courtesy of the American Board of Orthodontics and was very well received. Bill had spent many hours in research on the numerous problems that confront an orthodontist in sickness and his estate after he is deceased.

Glen Foor and Everett Watkins presented ten finished cases which had been presented before the American Board of Orthodontics in the spring of 1953. They showed some beautifully treated cases, many of which presented difficult problems.

The meeting was attended by a very large group of both guests and associate members, which attests to the fact that the Central component is growing rapidly.

Southern Component

Our meeting was called to order by Chairman Herbert Shannon, Friday afternoon, Sept. 10, 1954, in the Nikabob Restaurant.

Program Chairman Jess Linn introduced J. Eugene Ziegler, D.D.S., who spoke on problems of caries and its control, the periodontium and its health, diet and its place, bone, and general health. Dr. Ziegler stressed the importance of good healthy tissues before beginning orthodontic treatment.

Jess Linn introduced Clawson N. Skinner, who gave his concept of function of the denture based on neuromuscular mechanism of the individual.

Cecil Neff, chairman of By-Laws Committee, reported the difficulties encountered in settling the practice of a deceased orthodontist. National recognition of this problem has been accentuated by the appointment of a committee by the A. A. O. to help solve it. Dr. Neff presented the following resolution:

> "Resolved that the Southern Component of the Pacific Coast Society of Orthodontists go on record as favoring an amendment or addition to the constitution of the A. A. O. that will lead toward uniformity of training of all orthodontists, and will raise the standards of the requirements for membership in component societies."

Robert Whitney moved, and Stenson Dillon seconded the motion, that this resolution and our suggestions be sent to John Thompson, chairman of the By-Laws Committee. Motion carried.

Southwestern Society of Orthodontists

If the continued interest and attention of those present and their favorable comments are a criterion of the quality of a program, then the meeting of the Southwestern Society of Orthodontists at the Skirvin Hotel in Oklahoma City, Oct. 10 through 13, 1954, was a success. Many of the 138 members, guests, and exhibitors present made comments to this effect.

The scientific program featured Dr. Charles H. Tweed, Tucson, Arizona, and Dr. Samuel D. Gore, New Orleans, Louisiana, with a case report by Dr. Paul E. Gilliam, Houston, Texas.

Dr. Tweed, with the aid of headplates, films, and charts, presented his procedure of diagnosis in a series of three lectures. The results of the treatment were ably demonstrated by comparison of "before" and "after" casts, charts, photographs, and drawings. A comparison of the charts also indicated the extent and direction of the movements of the teeth. As always, his lectures were well presented and were most interesting. This

is the second time Dr. Tweed has appeared on the program of the Southwestern Society; the first time was just ten years ago.

Dr. Gore, in a series of three lectures and a clinic, presented the advantages and disadvantages of the use of the removable precious metal appliance, the technique of construction, and its application in treatment. With the use of this appliance, the construction and use of bands are eliminated. Yet, with the comparison of the "before" and "after" illustrations of casts and photographs, he accomplished what to many of us seemed impossible in the movement and rotation of individual teeth. Incidentally, he stated he has not used a band in many years. It opened the eyes of many of us who are more or less committed to the use of bands. We gathered from Dr. Gore's presentation that he must have a "way" with his patients in securing their wholehearted cooperation in following his instructions. Dr. Gore, in his clinic, demonstrated the technique of the construction of the removable appliance and, with casts, showed the results attained.

The presentations by these two lectureres were most helpful, even though their concepts and techniques differed (from that of full-banded fixed appliance to that of a removable appliance with no bands). Thus we learned from the highest source of authority of each concept with question-and-answer periods and knew more about orthodontics and each other's problems.

Dr. Gilliam presented a case report on serial extraction. His differential diagnosis covering the question of when to and when not to adopt serial extraction was convincingly demonstrated.

A detailed account of each of the twenty-six clinics is beyond the scope of this report. The wide variety of clinics presented is evidence of the progressive interest of our members in orthodontics and their desire to have a part in the program.

The president's address chiefly concerned some weaknesses in the orderly operation of the constitution and by-laws. All of his recommendations were adopted. Amendments were duly prepared and presented to the Society for regular action.

The membership unanimously disapproved the proposal that the qualifications of applicants for membership be limited to graduate training in recognized graduate schools. The body felt that some phase of preceptorship, as well, should have recognition.

An impressive occasion, growing in importance each year, is the breakfast program for the indoctrination of the members elected the preceding year. In a spirit of fine fellowship they are apprised of their relation and responsibility to their profession, to society, to their patients, and to ethics in general.

Beginning with the organization of the Southwestern Society of Orthodontists and for many years thereafter, Paul Spencer served in some official capacity in the Society. Through his fine spirit of hospitality and fellowship and his educational concepts, he exercised much influence in setting a high standard of programs for our Society. It was a pleasant privilege, therefore, for the Southwestern Society of Orthodontists to present to him the Martin Dewey Memorial Award.

Always the high lights of the Southwestern meetings are the fellowship hours, including the programs for the ladies, the stag parties, the social hour, and the dinner dance. Here we look forward to greeting old friends and giving a hearty and warm welcome to the new members and their wives. Needless to say, such gatherings are joyful occasions.

The theory on which this program was built was in line with the original concept of the members at the time the Southwestern Society was organized. Knowing that the personal equations are not constant with all individuals and that one's individual dexterity varies from that of another, it was generally accepted that our Society would progress better and our patients would be served best if we adopted an open mind as to theories and concepts.

The next meeting of the Southwestern Society of Orthodontists will be held at the Broadview Hotel in Wichita, Kansas, Oct. 16 through 19, 1955.

W. E. FLESHER.

Martin Dewey Award Committee Presents Award to Paul G. Spencer

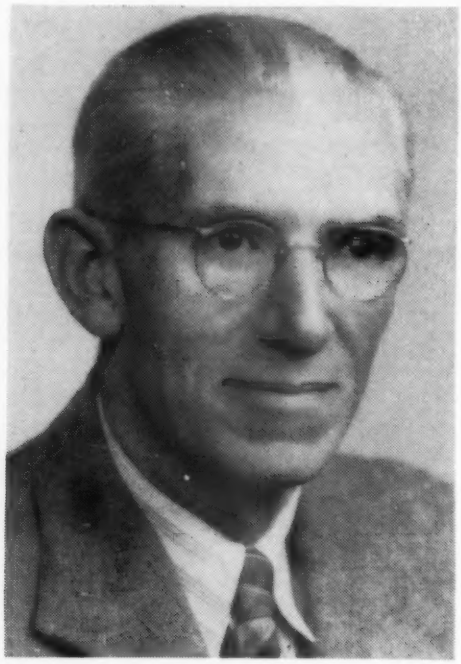
On behalf of the Southwestern Society of Orthodontists at its annual meeting which was held in Oklahoma City, Oklahoma, Oct. 11, 12, and 13, 1954, the Martin Dewey Award

Committee presented its award to Paul Guy Spencer in recognition of outstanding contributions to the advancement of orthodontics.

The award, which was presented with informal remarks by Dr. E. B. Arnold of Houston, Texas, was delivered subsequent to the meeting to Dr. Spencer at Boerne, Texas, by Dr. Brooks Bell of Dallas, Texas, a member of the committee. Dr. Spencer's message of acceptance follows.

TO THE DEWEY AWARD COMMITTEE, MEMBERS, GUESTS:

It is with deep regret that I am unable physically to be present and extend my thanks and appreciation personally to the membership and the Committee for selecting me to receive this award.



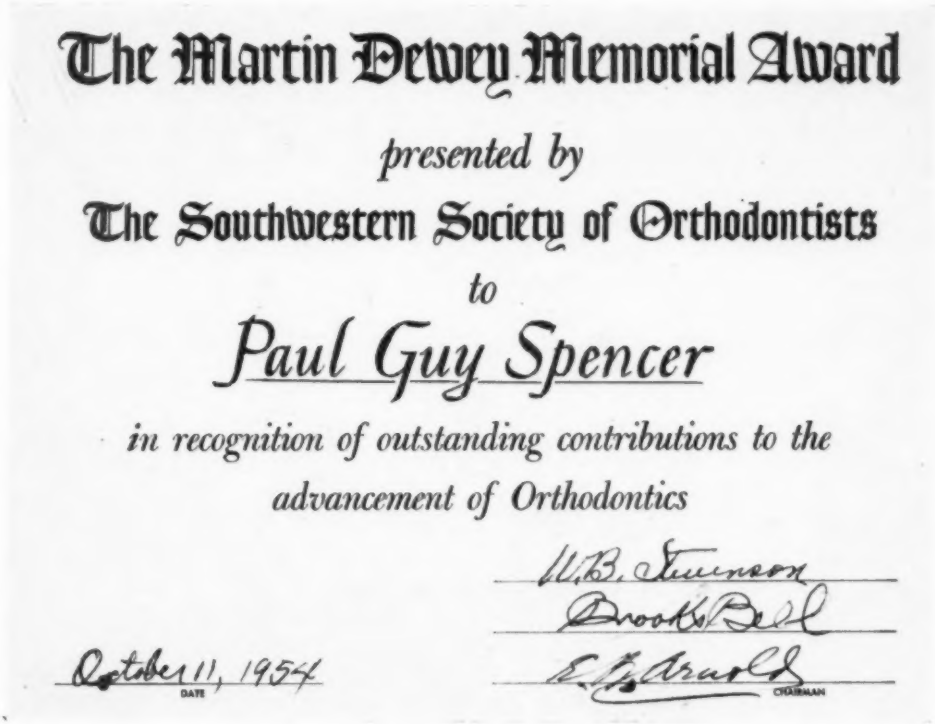
PAUL G. SPENCER, RECIPIENT OF THE MARTIN DEWEY MEMORIAL AWARD.

In addition to being fully aware that there are many others much more deserving of the honor, I also feel that the principal objective of the award is to give this Society the opportunity to pay annual tribute to the memory of Dr. Martin Dewey.

Very few men in dentistry, either past or present, have given as much of their time, effort, and talents toward the progress of orthodontics as did Martin Dewey. He filled a certain position with credit to himself and to our specialty that few fully understand or appreciate. It is doubtful if there is any other specialty of dentistry or medicine that has been beset with so many passing fads and fancies and conflicting personalities as has occurred in orthodontics. Dr. Dewey became the balance wheel and the critic in evaluating theories that arise from wishful thinking. He offered no cure-all. He sponsored no panacea, but he did instill into those who followed him, and in equal measure to those who might disagree, the desire to study and think—which is the real basis of all progress.

I am certain that those who helped form this Society never dreamed that it would become as large as it is today. To me this Society has been the most helpful of any organization in my professional life. Our meetings have been most informal, but with a desire to progress that cannot be surpassed. In a bit more than one-third of a century, we have had 99 per cent of those instrumental in orthodontic progress appear on our programs, and many of our members likewise have contributed to the programs of other so-

cieties. We have sought the viewpoints and concepts of all methods of orthodontic progress and practice, leaving to the individual member to judge and accept that which may be helpful and to discard that which is not.



THE DEWEY AWARD

If this Society can equal or possibly surpass its accomplishments of the past, its successful future is assured. If we permit others to do our thinking and beome complacent and satisfied in the belief that we already have the perfect solution, then we should remind ourselves that many others in the past, with equally good reasons, also thought perfection had been attained. Nothing succeeds like success, but nothing prevails and endures except the truth. In any event, these remarks are made with a heart full of appreciation for the many, many nice things that this Society has done for me. I shall always be sincerely and humbly grateful.

In closing, I recall a few lines that have always appealed to me.

"Fame is a food that dead men eat
I have no stomach for such meat
In little light and narrow room
They eat it in the silent tomb
With no kind voice of comrade near
To bid the banquet be of cheer
But friendship is a nobler thing
Of friendship it is good to sing!!
For truly when a man shall end
He lives in memory of his friend
Who doth his better part recall
And of his faults make funeral."

Henry Austin Dobson.

Thank you,

PAUL G. SPENCER

The European Orthodontic Society

The Thirtieth Annual Congress of the European Orthodontic Society was held at Eastbourne, England, July 1 to 6, 1954, under the presidency of Dr. Ernest Rix. Dr. Rix is head of the children's department at Guy's Hospital Dental School, London. His many works upon problems in orthodontics, especially those concerning the role that abnormal swallowing behaviors play in the etiology of malocclusions, have made a profound impact upon modern thought regarding diagnosis and treatment, and the Society counts itself fortunate to have had him in this place of honor. There were seventeen papers delivered by speakers from all over Europe and one from Dr. Holly Broadbent, who delighted his audience with a wealth of illustrated material linked together with the richly inspissated thought borne of long experience and rare judgment. The members of the European Orthodontic Society were particularly happy that not only were Mrs. Broadbent and Dr. Holly Broadbent, Jr., able to be present for much of the meeting, but also Mr. Charles Bolton, to whom dentists everywhere owe a special debt.

The subjects of the papers ranged over a considerable field. After an address by the president, Dr. Gwynne-Evans, a well-known otolaryngologist with particular interests in the etiology of malocclusion, gave a stimulating paper on the orofacial muscles and their function and behavior in relation to the teeth. This theme followed naturally upon the president's observations and was further developed by Dr. Fieux and Dr. Cauhepé from Paris and Dr. Walther from London. Professor Eschler from Germany then gave an account of the electromyographic researches that he has been conducting and this lecture brought the first day's proceedings to a close. On the following day Dr. Lundstrom gave a preliminary report of an investigation of genetic and nongenetic factors in 100 pairs of twins; Professor Fernex of Geneva discussed malocclusion from the histologic and embryologic viewpoints, and both Professor Muzj and his colleagues from Italy and Professor Bjork from Copenhagen had somewhat similar themes for their papers—the association between dental development and body type or build. From Ireland came an investigation into the dentition of the Aran Islanders conducted by Drs. Dockrell, Clinch, and Scott and, again with Dr. Broadbent's paper, a very full day came to an end. Monday opened with a provocative, though not entirely harmonious, trilogy of papers upon the relation between periodontal disease and malocclusion. The speakers were Dr. Hellgren from Stockholm, and Drs. Hovell and Emslie from London. A lively and exhilarating discussion followed and was dealt with in a no less vigorous manner by the essayists in their replies. Then Dr. Harvold, whose work on cleft palate restoration by orthodontic methods is widely known and who had recently returned from an extended stay at Toronto, gave an account of the very specialized aspects of these deformities. Drs. Grewcock and Ballard of London then discussed abnormal paths of closure of the mandible and their clinical significance from both the orthodontic and prosthetic standpoints, and the last paper came from Dr. Reitan of Oslo upon "Tissue Reaction as Related to the Age Factor." As the president so truly remarked, there was such a wealth of material that only when published in the *Transactions* of the Society could it be fully appreciated. On the following day there was a full program of demonstrations and these, as always, were given full attention by the members. It would take too long in this brief account to enumerate each one.

A full social program of presidential reception, civic reception, banquet, and excursion on Sunday to the historic seat of the Sidney family, Penshurst Place, kept the members and their ladies very fully occupied and all who attended will doubtless long remember this notable meeting held in one of England's most beautiful seaside resorts nestling close to the largest and most imposing mass of the white cliffs of Albion—Beachy Head.

Professor Edmundo Muzj of Rome was elected as president to succeed Dr. Rix, and the next congress will be held in Rome in September, 1955.

G. E. M. Hallett
Editor, European Society of Orthodontists

Johnson Alumni Club

The Johnson Alumni meeting will be held at the Brown Hotel in Louisville, Kentucky, Jan. 30 through Feb. 2, 1955.

University of Illinois

The University of Illinois College of Dentistry is presenting a one-day television course especially for members of the American Association of Orthodontists on Sunday, Feb. 6, 1955.

The course will be given under the direction of Dr. William Downs, Professor of Orthodontics.

Additional information may be secured from the University of Illinois College of Dentistry, Chicago, Illinois.

Tufts College Dental School

The following orthodontic courses will be offered at Tufts College Dental School during the 1954-55 academic year.

DPG. 401—Orthodontics.

Each Wednesday for eight weeks from Feb. 9 to March 30, 1955.

Dr. Herbert Margolis and Staff.

DPG. 402—Cephalographics and Diagnosis.

Monday, Tuesday, and Wednesday, March 21, 22, 23, 1955.

Dr. Herbert Margolis and Staff.

Orthodontist Serves on Board of Health

At the direction of the West Virginia State Dental Association, an orthodontist fills an important role in the health services of that state.

The State Board of Health was formed in 1950, and the members included three physicians, one dentist, one osteopath, one pharmacist, one hospital manager, one engineer, and one member of the press.

The State Dental Society chose an orthodontist, William M. Jarrett, D.D.S., to represent it for two years, serving as Chairman of the Board. In 1952 Dr. Jarrett was reappointed for a term of nine years.

The activities of this Board have attracted no small amount of attention on a national level for several reasons. One is its action in the approval of sterilization operations for patients in state mental hospitals. Plainly, the operations are performed on patients reasonably expected to produce potentially inferior offspring in the future.

The entire Board hears the evidence in these cases before a decision is officially made. It is believed that this is one of the few instances where a dentist specializing in orthodontics has served as Chairman of the State Board of Health.

Notes of Interest

Dr. Morton Cohen announces his return from service with the United States Navy and the opening of offices at 1009 West Main St., Norristown, Pennsylvania, for the practice of orthodontics.

Monroe M. Gliedman, D.D.S., and Richard Gliedman, D.D.S., wish to announce the opening of their office for the practice of orthodontics at The Pintard, 650 Main St., New Rochelle, New York.

F. W. Heitman, Jr., D.D.S., announces the removal of his office to 564 West 25th St., Merced, California, practice limited to orthodontics.

Seymour Levin, D.D.S., announces that after Oct. 11, 1954, his office will be located at 716 Main St., Poughkeepsie, New York, practice now limited to orthodontics.

Nicholas R. Nichols, III, D.D.S., announces the removal of his offices to 218 Hamilton National Bank Bldg., Chattanooga, Tennessee, practice limited to orthodontics.

James E. Weesner, D.D.S., announces that he will devote full time to his office at 616 Sharp Bldg., Lincoln, Nebraska, practice limited to orthodontics.

OFFICERS OF ORTHODONTIC SOCIETIES

The AMERICAN JOURNAL OF ORTHODONTICS is the official publication of the American Association of Orthodontists and the following component societies. The editorial board of the AMERICAN JOURNAL OF ORTHODONTICS is composed of a representative of each one of the component societies of the American Association of Orthodontists.

American Association of Orthodontists

President, Frederick T. West - - - - - - - - 760 Market St., San Francisco, Calif.
President-Elect, Philip E. Adams - - - - - - - 106 Marlborough St., Boston, Mass.
Vice-President, George H. Herbert - - - - - - - - 7002 Pershing Ave., St. Louis, Mo.
Secretary-Treasurer, Franklin A. Squires - - - - - Medical Centre, White Plains, N. Y.

Central Section of the American Association of Orthodontists

President, Howard Yost - - - - - - - - - - - - - - - - Grand Island, Neb.
Secretary-Treasurer, Frederick B. Lehman - - - - - - - - 1126 Merchants Bank Bldg., Cedar Rapids, Iowa

Great Lakes Society of Orthodontists

President, Louis Braun - - - - - - - - - 1601 David Whitney Bldg., Detroit, Mich.
Secretary, Hunter I. Miller - - - - - - - - 1416 Mott Foundation Bldg., Flint, Mich.
Treasurer, George S. Harris - - - - - - - - - 18520 Grand River Ave., Detroit, Mich.

Middle Atlantic Society of Orthodontists

President, B. Edwin Erikson - - - - - 3726 Connecticut Ave., N. W., Washington, D. C.
Secretary-Treasurer, Paul Deems - - - - - - - - - 835 Park Ave., Baltimore, Md.

Northeastern Society of Orthodontists

President, Philip E. Adams - - - - - - - - - 170 Marlborough St., Boston, Mass.
Secretary-Treasurer, Wilbur J. Prezzano - - - - - - Medical Centre, White Plains, N. Y.

Pacific Coast Society of Orthodontists

President, Arnold E. Stoller - - - - - - - - - Medical Dental Bldg., Seattle, Wash.
Secretary-Treasurer, Raymond M. Curtner - - - - - - 450 Sutter St., San Francisco, Calif.

Rocky Mountain Society of Orthodontists

President, Don V. Benkendorf - - - - - - - - - Metropolitan Bldg., Denver, Colo.
Secretary-Treasurer, Curtis L. Benight - - - - - - - 1001 Republic Bldg., Denver, Colo.

Southern Society of Orthodontists

President, Leigh C. Fairbank - - - - - - - - 1726 Eye St., N.W., Washington, D. C.
Secretary-Treasurer, M. D. Edwards - - - - - - - 132 Adams Ave., Montgomery, Ala.

Southwestern Society of Orthodontists

President, Marion A. Flesher - - - - - - Medical Arts Bldg., Oklahoma City, Okla.
Secretary-Treasurer, Fred A. Boyd - - - - - - - 1502 North Third St., Abilene, Texas

American Board of Orthodontics

President, Raymond L. Webster - - - - - - - - 133 Waterman St., Providence, R. I.
Vice-President, Ernest L. Johnson - - - - - - - - 450 Sutter St., San Francisco, Calif.
Secretary, G. Edward Martinek - - - - - - - - - 661 Fisher Bldg., Detroit 2, Mich.
Treasurer, Lowrie J. Porter - - - - - - - - - 41 East 57th St., New York, N. Y.
Director, William R. Humphrey - - - - - - - - - - - - Republic Bldg., Denver, Colo.
Director, L. Bodine Higley - - - - - University of North Carolina, Chapel Hill, N. C.
Director, Wendell L. Wylie - - - - University of California, San Francisco, Calif.

INDEX TO VOLUME 40

AUTHORS INDEX

A

ANDERSON, B. G. (*See* SEIPEL, VAN WAGENEN, AND ANDERSON), 37

APPLEBAUM, EDMUND, AND LEVY, HENRY P. Changes in the mandibular condyles of mice following the use of orthodontic bite plates, 775

B

BACH, E. N. Report of "orthodontic children" covering a period of twenty-five years, 83

BAKER, R. E. The tongue and dental function, 927

BEDELL, WALTER R. The use of tissue-bearing anchorage alone and in conjunction with various techniques in treatment, 407

BEGG, P. R. Stone Age man's dentition, 298, 373, 462, 517

BIEDERMAN, WILLIAM. Criteria for appraising cephalometric norms, 421

BRODIE, ALLAN G. (*See* SUBTELNY AND BRODIE), 686

C

COHEN, M. MICHAEL, AND GARN, STANLEY MARION. Factors in occlusion, 671

COX, GEORGE C. (*See* MEREDITH AND COX), 134

CROUCH, J. THOMAS. (*See* MOYERS, HARVOLD, JENKINS, SHULTIS, AND CROUCH), 341

D

DEWEL, B. F. Serial extraction in orthodonties: indications, objectives, and treatment procedures, 906

DONOVAN, ROBERT W. Recent research for diagnosis, 591

F

FARBER, EUGENE H. A rational approach to the treatment of the mixed dentition, 610

FASTLICHT, SAMUEL. Treatment of impacted canines, 891

FRANKLIN, J. B. The effect of high kilovoltage on hard and soft tissue definition in lateral cephalometric roentgenograms, 837

FRIEL, SHELDON. The development of ideal occlusion of the gum pads and the teeth, 196

G

GARN, STANLEY MARION. (*See* COHEN AND GARN), 671

GORE, S. D. Treatment of a Class II malocclusion in mixed dentition with the use of removable appliances, 359

GRABER, T. M. A cephalometric appraisal of the results of cervical gear therapy, 60

—. A critical review of clinical cephalometric radiography, 1

GRIFFIN, JOHN M. The use of chrome alloy in edgewise technique, 450

H

HARVOLD, EGIL. Cleft lip and palate, 493

—. (*See* MOYERS, HARVOLD, JENKINS, SHULTIS, AND CROUCH), 341

HIGLEY, L. BODINE. Cephalometric standards for children 4 to 8 years of age, 51

—. Principles and methods of treatment, 832

—. Rational approaches in orthodontic diagnosis, 109

HOFFMEISTR, F. S. (*See* MANLY, HOFFMEISTR, AND YURKSTAS), 756

HOLMES, SCOTT T. President's address, Great Lakes Society of Orthodontists, 487

HOWES, ASHLEY E. A polygon portrayal of coronal and basal arch dimensions in the horizontal plane, 811

J

JARABAK, JOSEPH R. Subcondylar fractures of the mandible: research and treatment, 729

JENKINS, H. (*See* MOYERS, HARVOLD, JENKINS, SHULTIS, AND CROUCH), 341

JENSEN, ELLI, AND PALLING, MOGENS. The gonial angle, 120

K

KOCH, CLARENCE W. President's address, Southwestern Society of Orthodontists, 649

L

LEVY, HENRY P. (*See* APPLEBAUM AND LEVY), 775

LUSTERMAN, EDWARD A. Treatment of a Class II, Division 2 malocclusion involving mesiodistal reduction of mandibular anterior teeth, 44

M

McCoy, James David. The treatment of a typical distoclusion case employing the open-tube appliance, 163

MacEwan, Donald C. Treatment of a typical distoclusion case, 350

Malone, Anthony J., and Massler, Maury. (*See* Massler and Malone), 619

Manly, R. S., Hoffmeistr, F. S., and Yurkstas, A. Masticatory function of children with orthodontic disturbances, 756

Marshall, David. Rationale of mandibular prognathism, 281

Martinek, C. Edward. The American Board of Orthodontics, 189

Massler, Maury. Changes in the lamina dura during tooth movement, 364

—, and Malone, Anthony J. Root resorption in human permanent teeth, 619

Meredith, Howard V., and Cox, George C. Widths of the dental arches at the permanent first molars in children 9 years of age, 134

Moyers, R. E., Harvold, E., Jenkins, H., Shultis, K., and Crouch, J. Thomas. Intraoral factors affecting case assessment, 341

N

Nanda, Ram Sarup. Agenesis of the third molar in man, 698

P

Palling, Mogens. (*See* Jensen and Palling), 120

Pelton, Walter J. Orthodontics from the public health viewpoint, 27

Pollock, H. C. Orthodontic trends—past and present, 272

S

Salzmann, J. A. General growth acceleration and retardation in relation to dentofacial development, 243

—. Problems in dental editing, 707

Schudy, F. F. The use of the edgewise mechanism in the treatment of Class II, Division 1 malocclusion, 179

Scott, J. H. The growth and function of the muscles of mastication in relation to the development of the facial skeleton and of the dentition, 429

Seipel, C. M., van Wagenen, G., and Anderson, B. G. Developmental disturbances and malocclusion of the teeth produced by androgen treatment in the monkey (Macaca mulatta), 37

Shultis, K. (*See* Moyers, Harvold, Jenkins, Shultis, and Crouch), 341

Simon, Louis A. (*See* Strusser and Simon), 654

Sleichter, Charles G. Effects of maxillary bite plane therapy in orthodontics, 850

Stoller, Arnold E. The normal position of the maxillary first permanent molar, 259

Strang, Robert H. W. Treatment problems: their origin and elimination, 765

Strusser, Harry, and Simon, Louis A. Orthodontics in public health practice, 654

Subtelny, Jacob D., and Brodie, Allan G. An analysis of orthodontic expansion in unilateral cleft lip and cleft palate patients, 686

Sved, Alexander. A critical review of cephalometrics, 567

Swann, Gordon C. The diagnosis and interception of Class II, Division 2 malocclusion, 325

V

van Wagenen, G. (*See* Seipel, van Wagenen, and Anderson), 37

W

White, Robert B. Some viewpoints on extraction, 507

Y

Yurkstas, A. (*See* Manly, Hoffmeistr, and Yurkstas), 756

SUBJECT INDEX

A

Adaptive chin, 948 (Abst.)
Age and malocclusion, survey of 143 periodontal cases in terms of, 234 (Abst.)
changes; gonial angle, 126
Agenesis of third molar in man, 698
American Association for Cleft Palate Rehabilitation, 322, 726
of Orthodontists, 239, 405
annual meeting, 1955, 644, 721, 803, 883, 950
Central Section of, 724, 885
fiftieth annual session, 71, 239, 318, 536, 558
Golden Anniversary Luncheon, 536, 722
installation of new A.A.O. officers, 722
International Luncheon, 544
Past Presidents' Luncheon, 546
principles for determining acceptability for participation in public health and prepayment orthodontic plans by members of, 723
1955 prize essay contest, 643, 802, 883, 950
report of Education Committee of, 1954, 944
report of president of American Board of Orthodontics to directors of, 793
of Public Relations Committee, 1954, 941
of Research Committee, 940
research essay contest of, 1954, 880
section meeting of, 159, 644, 802, 884, 951
Board of Orthodontics, 71, 160, 189, 240, 562, 645, 726, 806, 884, 951
A.B.O. theses available for reading on constituent society programs, 804
certification by, 189
report of president of, to directors of American Association of Orthodontists, 793
Dental Association, 77, 889
principles for determining acceptability of dental prepayment plans, 723
Institute of Dental Medicine, 485, 564, 726
Anchorage, tissue-bearing, use of, alone and in conjunction with various techniques in treatment, 407
Androgen treatment, developmental disturbances and malocclusion of teeth produced by, in monkey (Macaca mulatta), 37
Anodontia, complete, with ectodermal dysplasia, fourteen-year report of facial growth in case of, 237 (Abst.)
Apparatus and technique for temporomandibular radiography, 69 (Abst.)
Appliance, open-tube, treatment of typical distoclusion case employing, 163
Appliances, removable, treatment of Class II malocclusion in mixed dentition with use of, 359
Arch dimensions, coronal and basal, in horizontal plane, polygon portrayal of, 811
wires, forming; use of chrome alloy in edgewise technique, 458
Arches, dental, widths of, at permanent first molars in children 9 years of age, 134
Association of Military Surgeons of United States, 809

B

Baker, Dr. Charles R., receives orthodontics' highest award, 646
Bands, preformed; use of chrome alloy in edgewise technique, 457
Bite plane therapy, maxillary, in orthodontics, effects of, 850
plates, orthodontic, changes in mandibular condyles in mice following use of, 775
Body build, human, variations in; somatometric and x-ray cephalometric investigation on Scandinavian adults, 799 (Abst.)
Bolton point, mathematical grid coordinate method of locating, 232 (Abst.)
observation which may clarify location of, in oriented cephalometric radiographs, 157 (Abst.)

C

Canines, impacted, treatment of, 891
Caries; Stone Age man's dentition, 380
Case assessment, intraoral factors affecting, 341

Central Section of American Association of Orthodontists, 724, 885
Cephalometric appraisal of results of cervical gear therapy, 60
norms, criteria for appraising, 421
radiographs, oriented, observation which may clarify location of Bolton Point in, 157 (Abst.)
radiography, clinical, critical review of, 1
roentgenograms, lateral, effect of high kilovoltage on hard and soft tissue definition in, 837
standards for children 4 to 8 years of age, 51
x-rays in Greek families, familiar resemblances in craniofacial osteology as revealed by, 233 (Abst.)
Cephalometrics, critical review of, 567
Cervical gear therapy, cephalometric appraisal of results of, 60
Children 4 to 8 years of age, cephalometric standards for, 51
9 years of age, widths of dental arches at permanent first molars in, 134
orthodontic, report of, covering period of twenty-five years, 83
with orthodontic disturbances, masticatory function of, 756
Children's Bureau; orthodontics from public health viewpoint, 29
U. S. Department of Health, Education, and Welfare, 76
Chin, adaptive, 948 (Abst.)
Chrome alloy, use of, in edgewise technique, 450
Class II, Division 1 malocclusion, use of edgewise mechanism in treatment of, 179
Division 2 malocclusion, diagnosis and interception of, 325
treatment of, involving mesiodistal reduction of mandibular anterior teeth, 44
malocclusion in mixed dentition, treatment of, with use of removable appliances, 359
therapy; cephalometric appraisal of results of cervical gear therapy, 60
III malocclusion, differences between facial skeletal pattern of, and normal occlusion, 148 (Abst.)
Cleft lip and cleft palate, unilateral, patients, analysis of orthodontic expansion in, 686
and palate, 493
Palate Rehabilitation, American Association for, 322
Clinical cephalometric radiography, critical review of, 1
Cohen, Rose, Memorial Lecture, 161
Condyle, radiographic and clinical study of positions of, in individuals exhibiting malfunction of temporomandibular joints, 231 (Abst.)
Condyles, mandibular, of mice, changes in, following use of orthodontic bite plates, 775
Correspondence, 388, 549, 551
Craniofacial osteology, familiar resemblances in, as revealed by cephalometric x-rays in Greek families, 233 (Abst.)

D

Dental arches, widths of, at permanent first molars in children 9 years of age, 134
editing, problems in, 707
function, tongue and, 927
public health programs; orthodontics from public health viewpoint, 27
Dentition, development of facial skeleton and of, growth and function of muscles of mastication in relation to, 429
forces about, temporary report on, 234 (Abst.)
mixed, rational approach to treatment of, 610
treatment of Class II malocclusion in, with use of removable appliances, 359
order of eruption of permanent human, 477 (Abst.)
Stone Age man's, 298, 373, 462, 517
Dentofacial development, general growth acceleration and retardation in relation to, 243
Denver Summer Meeting for Advancement of Orthodontic Practice and Research, 563, 726
Development, dentofacial, general growth acceleration and retardation in relation to, 243
of facial skeleton and of dentition, growth and function of muscles of mastication in relation to, 429
of ideal occlusion of gum pads and teeth, 197
osseous, from birth to 14 years, method of evaluating, 391 (Abst.)
Developmental disturbances and malocclusion of teeth produced by androgen treatment in monkey (Macaca mulatta), 37
Dewey, Martin, Award Committee presents award to Paul G. Spencer, 955
Diagnosis and interception of Class II, Division 2 malocclusion, 325
orthodontic; gonial angle, 129
rational approaches in, 109
recent research for, 591
Distoclusion case, typical, treatment of, 350
employing open-tube appliance, 163
mandibular morphology of, 232 (Abst.)
Doctor draft registrants may be reassigned to Army Ready Reserve Units, 240
Dwarfism; general growth acceleration and retardation in relation to dentofacial development, 253
pituitary, and growth hormone factor; factors in occlusion, 676

Dysplasia, congenital ectodermal, facial growth in; factors in occlusion, 672
ectodermal, facial growth in case of complete anodontia with, fourteen-year report of, 237 (Abst.)

E

Edgewise mechanism, use of, in treatment of Class II, Division 1 malocclusion, 179
technique, use of chrome alloy in, 450
Editing, dental, problems in, 707
Education Committee of American Association of Orthodontists, report of, 1954, 944
Electromyographic data, study to develop standardized method by which, may be recorded for serial evaluation, 230 (Abst.)
Electromyography; recent research for diagnosis, 592
Embryologic evidence for non-existence of premaxilla in man, 235 (Abst.)
Eruption, intra-alveolar; intraoral factors affecting case assessment, 343
of permanent human dentition, order of, 477 (Abst.)
teeth in British children in 1947-8, time of, 479 (Abst.)
Etiology of malocclusion; Stone Age man's dentition, 462
European Orthodontic Society, 958
Evolutionary aspects of gonial angle changes; gonial angle, 120
Extraction of teeth adjacent to maxillary sinus in dog, change of volume after, 237 (Abst.)
for orthodontic purposes; Stone Age man's dentition, 469
serial, in orthodontics: indications, objectives, and treatment procedures, 906
some viewpoints on, 507

F

Face, evolutionary changes in bony architecture of; Stone Age man's dentition, 382
Facial growth in case of complete anodontia with ectodermal dysplasia, fourteen-year report of, 237 (Abst.)
in congenital ectodermal dysplasia; factors in occlusion, 673
influence of increments, time and direction of, on orthodontic therapy, 69 (Abst.)
study, State University of Iowa; cephalometric standards for children 4 to 8 years of age, 51
skeletal pattern, 600
skeleton, growth and function of muscles of mastication in relation to development of, and of dentition, 429
Facial—Cont'd
morphologic studies of; cleft lip and palate, 493
Fiftieth annual meeting of American Association of Orthodontists, 536
Florida Orthodontic Society, 483
Fractures, subcondylar, of mandible: research and treatment, 729
Frontal laminagraphy, application of, to study of nasopharyngeal development in normal and cleft palate children, 148 (Abst.)
Frontonasal suture, growth of rabbit snout after extirpation of, 236 (Abst.)
of rabbit, growth at: gross and serial roentgenographic study by means of metallic implants, 236 (Abst.)
Function, dental, tongue and, 927
growth and, of muscles of mastication in relation to development of facial skeleton and of dentition, 429
masticatory, of children with orthodontic disturbances, 756

G

Gigantism; general growth acceleration and retardation in relation to dentofacial development, 254
Golden Anniversary Luncheon, 536, 722
Gonial angle, 120
Gorman, Jacob A.; Southern Society honors pioneer orthodontist, 484
Great Lakes Society of Orthodontists, 72, 806
president's address, 487
Growth acceleration and retardation, general, in relation to dentofacial development, 243
and function of muscles of mastication in relation to development of facial skeleton and of dentition, 429
at frontonasal suture of rabbit: gross and serial roentgenographic study by means of metallic implants, 236 (Abst.)
comparative, Morquio's syndrome and; factors in occlusion, 679
facial, in congenital ectodermal dysplasia; factors in occlusion, 672
influence of increments, time, and direction of, on orthodontic therapy, 69 (Abst.)
hormone factor, pituitary dwarfism and; factors in occlusion, 676
of rabbit snout after extirpation of frontonasal suture, 236 (Abst.)
pattern of pig mandible: roentgenographic study using metallic implants, 235 (Abst.)
recent research for diagnosis, 605
Gum pads and teeth, development of ideal occlusion of, 196

H

High kilovoltage, effect of, on hard and soft tissue definition in lateral cephalometric roentgenograms, 837

Hinman, Thomas P., Mid-Winter Clinic, 76

Horizontal plane, polygon portrayal of coronal and basal arch dimensions in, 811

Hormones, sex; developmental disturbances and malocclusion of teeth produced by androgen treatment in monkey (Macaca mulatta) 37

Human body build, variations in; somatometric and x-ray cephalometric investigation on Scandinavian adults, 799 (Abst.)
permanent teeth, root resorption in, 619
premaxillary bone, topology of, 638 (Abst.)

Hunt, Vernon, dies in California, 888

I

Incisors, some observations upon environment of, 150 (Abst.)

In memoriam, Frederick C. Allen, 147
Dwight Anderson, 146
Maurice C. Berman, 64
Louis Braun, 314
Frank R. Bristol, 797
Charles R. Brooks, 476
I. William Bull, 637
James A. Burrill, 65
Edward J. Copping, 146
David Willard Flint, 796
Vernon Leslie Hunt, 947
Howard S. McElnea, 314
Clare Kenneth Madden, 63
William Michael Pugh, 713
Joseph P. Serafino, 67
Fred E. Sims, 873
William J. Speers, 547
Henry Spenadel, 67
Charles Rush Straub, 797
Thomas Ralph Sweet, 313

Interception, diagnosis and, of Class II, Division 2 malocclusion, 325

Intermaxillary hooks; use of chrome alloy in edgewise technique, 459

International Luncheon; fiftieth annual meeting of American Association of Orthodontists, 544

J

Jackson, Andrew F., and Swinehart, Earl W., luncheon in honor of, 951

Jarrett, William M.; orthodontist serves on board of health, 959

Johnson Alumni Club, 959

K

Ketcham, Albert H., memorial award, 1954, presentation of, by Raymond L. Webster, President of American Board of Orthodontics, 783
response by Charles R. Baker to presentation of, 787
Award; Dr. Charles R. Baker receives orthodontics' highest award, 646

Kilovoltage, high, effect of, on hard and soft tissue definition in lateral cephalometric roentgenograms, 837

L

Lamina dura, changes in, during tooth movement, 364

Laminagraphy, frontal, application of, to study of nasopharyngeal development in normal and cleft palate children, 148 (Abst.)

Lingual wire, used in maxillary retraction; treatment of typical distoclusion case, 350

Lip and palate, cleft, 493
cleft, and cleft palate, unilateral, patients, analysis of orthodontic expansion in, 686
surgery, effects of, on clefts of palate; analysis of orthodontic expansion in unilateral cleft lip and cleft palate patients, 690

M

Macrognathia; criteria for appraising cephalometric norms, 421

Malfunction of temporomandibular joints, radiographic and clinical study of positions of condyle in individuals exhibiting, 231 (Abst.)

Malocclusion, age and, survey of 143 periodontal cases in terms of, 234 (Abst.)
Class II, Division 1, use of edgewise mechanism in treatment of, 179
2, diagnosis and interception of, 325
treatment of, involving mesiodistal reduction of mandibular anterior teeth, 44
in mixed dentition, treatment of, with use of removable appliances, 359
III, and normal occlusion, differences between facial skeletal pattern of, 148 (Abst.)
etiology of; Stone Age man's dentition, 462
of teeth, developmental disturbances and, produced by androgen treatment in monkey (Macaca mulatta), 37
relation of speech defects and, 149 (Abst.)
treatment of; some viewpoints on extraction, 507

Mandible, subcondylar fractures of: research and treatment, 729
Mandibular anterior teeth, treatment of Class II, Division 2 malocclusion involving mesiodistal reduction of, 44
condyles of mice, changes in, following use of orthodontic bite plates, 775
morphology of distoclusion, 232 (Abst.)
prognathism, rationale of, 281
Mastication, growth and function of muscles of, in relation to development of facial skeleton and of dentition, 429
Masticatory function of children with orthodontic disturbances, 756
Mathematical grid coordinate method of locating Bolton point, 232, (Abst.)
Maturity, physiological, indices of: derivation and interrelationships, 553 (Abst.)
Maxillary bite plane therapy in orthodontics, 850
first permanent molar, normal position of, 259
protrusion, types of; some viewpoints on extraction, 510
sinus, change in volume after extraction of teeth adjacent to, in dog, 237 (Abst.)
teeth, retraction of; treatment of typical distoclusion case, 350
Mechanism, edgewise, use of, in treatment of Class II, Division 1 malocclusion, 179
Medical Library Association, 405
Metallic implants, growth at frontonasal suture of rabbit: gross and serial roentgenographic study by means of, 236 (Abst.)
pattern of pig mandible: roentgenographic study using, 235 (Abst.)
Method of evaluating osseous development from birth to 14 years, 391 (Abst.)
mathematical grid coordinate, of locating Bolton point, 232 (Abst.)
standardized, by which electromyographic data may be recorded for serial evaluation, study to develop, 230 (Abst.)
Methods, principles and, of treatment, 832
Middle Atlantic Society of Orthodontists, 72, 646, 886, 953
luncheon in honor of Andrew F. Jackson and Earl W. Swinehart, 951
Mixed dentition, rational approach to treatment of, 610
treatment of Class II malocclusion in, with use of removable appliances, 359
Molar, maxillary first permanent, normal position of, 259
third, agenesis of, in man, 698
Molars, permanent first, widths of dental arches at, in children 9 years of age, 134
Morphologic studies of facial skeleton; cleft lip and palate, 493
Morphology, mandibular, of distoclusion, 232 (Abst.)
Morquio's syndrome and comparative growth; factors in occlusion, 679
Myodynagraph, photoelectric, for directing recording of oral muscle forces, 157 (Abst.)

N

Nasopharyngeal development in normal and cleft palate children, application of frontal laminagraphy to, 148 (Abst.)
Neuromuscular pattern; recent research for diagnosis, 592
News and notes, 71, 159, 239, 318, 405, 482, 558, 640, 721, 802, 880, 950
Normal position of maxillary first permanent molar, 259
standards, contribution of, to diagnosis; rational approaches in orthodontic diagnosis, 110
Northeastern Society of Orthodontists, 73, 160, 239, 564, 724, 807, 887, 953
Northwestern University, 78
Dental School, 405, 485
Notes of interest, 78, 161, 241, 323, 405, 485, 565, 647, 727, 809, 889, 959

O

Occlusion, anatomically correct; Stone Age man's dentition, 299, 462
factors in, 671
intraoral factors affecting case assessment, 347
of gum pads and teeth, development of ideal, 196
of permanent teeth of young adult; development of ideal occlusion of gum pads and teeth, 211
Officers of orthodontic societies, 79, 162, 242, 324, 406, 486, 566, 648, 728, 810, 890, 960
Open-tube appliance, treatment of typical distoclusion case employing, 163
Oral muscle forces, photoelectric myodynagraph for directing recording of, 157 (Abst.)
Orofacial structures, analysis of, with special reference to muscle behaviour and dental alignment, 715 (Abst.)
Orthodontic bite plates, changes in mandibular condyles of mice following use of, 775
children, report of, covering period of twenty-five years, 83

Orthodontic—Cont'd
diagnosis; gonial angle, 129
rational approaches to, 109
disturbances, masticatory function of children with, 756
expansion in unilateral cleft lip and cleft palate patients, analysis of, 686
societies of world and principal officers, list of, 80
therapy, influence of increments, time, and direction of facial growth on, 69 (Abst.)
tooth movement; changes in lamina dura during tooth movement, 364
trends—past and present, 272
wire, stainless steel, effect of section size and shape on mechanical properties of, 233 (Abst.)
Orthodontics, effects of maxillary bite plane therapy in, 850
from public health viewpoint, 27
in public health practice, 654
preventive; orthodontics in public health practice, 669
serial extraction in: indications, objectives, and treatment procedures, 906
Orthodontist serves on board of health, 959
Orthodontists honored, 888
Osseous development from birth to 14 years, method of evaluating, 391 (Abst.)
Osteology, craniofacial, familiar resemblances in, as revealed by cephalometric x-rays in Greek families, 233 (Abst.)

P

Pacific Coast Society of Orthodontists, 160, 482, 724, 953
Pain, pulpal; Stone Age man's dentition, 375
Palate, cleft lip and, 493
cleft, unilateral cleft lip and, patients, analysis of orthodontic expansion in, 686
Past Presidents' Luncheon, fiftieth annual meeting of American Association of Orthodontists, 546
Patient referral; president's address, Great Lakes Society of Orthodontists, 490
Periodontal cases, survey of 143, in terms of age and malocclusion, 234 (Abst.)
Photoelectric myodynagraph for directing recording of oral muscle forces, 157 (Abst.)
Physiological maturity, indices of: derivation and interrelationships, 553 (Abst.)
Pituitary dwarfism and growth hormone factor; factors in occlusion, 676
Polygon portrayal of coronal and basal arch dimensions in horizontal plane, 811
Position, normal, of maxillary first permanent molar, 259
Preformed chrome bands; use of chrome alloy in edgewise technique, 457
Premaxilla, embryologic evidence for nonexistence of, in man, 235 (Abst.)
Premaxillary bone, human, topology of, 638 (Abst.)
President's address, Great Lakes Society of Orthodontists, 487
Southwestern Society of Orthodontists, 649
Preventive orthodontics; orthodontics in public health practice, 669
Principles and methods of treatment, 832
for determining acceptability for participation in public health and prepayment orthodontic plans by members of American Association of Orthodontists, 723
of dental prepayment plans, American Dental Association, 723
of ethics of American Association of Orthodontists, 640
Prize essay contest, 1955, American Association of Orthodontists, 643, 802, 883, 950
Problems in dental editing, 707
treatment: origin and elimination, 765
Prognathism, mandibular, rationale of, 281
Public health practice, orthodontics in, 654
viewpoint, orthodontics from, 27
Relations Committee of American Association of Orthodontists, annual report of, 1954, 941
Pulpal pain; Stone Age man's dentition, 375
Pyorrhea; Stone Age man's dentition, 378

R

Racial variations in gonial angle; gonial angle, 124
Radiographic and clinical study of positions of condyle in individuals exhibiting malfunction of temporomandibular joints, 231 (Abst.)
Radiographs of temporomandibular articulation, evaluation of technique and implication in interpretation of, 231 (Abst.)
Radiography, clinical cephalometric, critical review of, 1
temporomandibular, apparatus and technique for, 69 (Abst.)
Referral of patients; president's address, Great Lakes Society of Orthodontists, 490
Rehabilitation program for dentally physically handicapped child, 875 (Abst.)
Relation of speech defects and malocclusion, 149 (Abst.)
Removable appliances, treatment of Class II malocclusion in mixed dentition with use of, 359

Report, annual, of Public Relations Committee of American Association of Orthodontists, 1954, 941
of Education Committee, American Association of Orthodontists, 1954, 944
of "orthodontic children" covering period of twenty-five years, 83
of president of American Board of Orthodontics to directors of American Association of Orthodontists, 793
of Research Committee, American Association of Orthodontists, 940
Research and treatment, subcondylar fractures of mandible, 729
Committee, American Association of Orthodontists, report of, 940
for diagnosis, recent, 591
section meeting of American Association of Orthodontists, 159, 644, 802, 884, 951
Retraction of maxillary teeth; treatment of typical distoclusion case, 350
Robinson, Homer B., Kansas journal honors, 484
Rocky Mountain Society of Orthodontists, 73
Roentgenograms, lateral cephalometric, effect of high kilovoltage on hard and soft tissue definition in, 837
Root resorption in human permanent teeth, 619

S

St. Louis University is host to dentists from Mexico, 889
Salzmann, J. A., honored in Jerusalem, 484
Serial extraction in orthodontics: indications, objectives, and treatment procedures, 906
Skeletal pattern, critical review of clinical cephalometric radiography, 1
Southern Society of Orthodontists, 74, 564, 725, 808
honors pioneer orthodontist, 484
Southwestern Society of Orthodontists, 75, 564, 646, 725, 808, 954
Martin Dewey Award Committee presents award to Paul G. Spencer, 955
president's address, 649
Speech defects and malocclusion, relation of, 149 (Abst.)
Spencer, Paul G., Martin Dewey Award Committee presents award to, 955
Stainless steel arch wire, thin round, universal tooth movement with; Stone Age Man's dentition, 517
orthodontic wire, effect of section size and shape on mechanical properties of, 233 (Abst.)
State University of Iowa Facial Growth Study; cephalometric standards for children 4 to 8 years of age, 51
Stone Age man's dentition, 298, 373, 462, 517
Subcondylar fractures of mandible: research and treatment, 729
Surgery, lip, effects of, on clefts of palate; analysis of orthodontic expansion in unilateral cleft lip and cleft palate patients, 690
Swinehart, Earl W., luncheon in honor of Andrew F. Jackson and, 951

T

Teeth, extraction of, for orthodontic purposes; Stone Age man's dentition, 469
some viewpoints on extraction, 507
gum pads and, development of ideal occlusion of, 196
human permanent, root resorption, 619
malocclusion of, developmental disturbances and, produced by androgen treatment in monkey (Macaca mulatta), 37
mandibular anterior, treatment of Class II, Division 2 malocclusion involving mesiodistal reduction of, 44
permanent, occlusion of in young adult; development of ideal occlusion of gum pads and teeth, 211
Temple University, 485, 565, 647, 726, 809
School of Dentistry, 564
Temporomandibular articulation, evaluation of technique and implication in interpretation of radiographs of, 231 (Abst.)
joints, malfunction of, radiographic and clinical study of position of condyle in individuals exhibiting, 231 (Abst.)
radiography, apparatus and technique for, 69 (Abst.)
Therapy, maxillary bite plane, effects of, in orthodontics, 850
cervical gear, cephalometric appraisal of results of, 60
orthodontic, influence of increments, time, and direction of facial growth on, 69 (Abst.)
Third Public Health Workshop on Dental Programs in Industry, 808
Tissue-bearing anchorage, use of, alone and in conjunction with various techniques in treatment, 407
Tongue and dental function, 927
Tooth eruption; Stone Age man's dentition, 373
irregularity and malocclusion; Stone Age man's dentition, 462
migration; Stone Age man's dentition, 374
movement, changes in lamina dura during, 364
universal, with thin round stainless steel arch wire; Stone Age man's dentition, 517
wear; Stone Age man's dentition, 307

Topology of human premaxillary bone, 638 (Abst.)
Torus palatinus and torus mandibularis, occurrence of, in 2,478 dental patients, 316 (Abst.)
Treatment of Class II, Division 1 malocclusion, use of edgewise mechanism in, 179
2 malocclusion involving mesiodistal reduction of mandibular anterior teeth, 44
malocclusion in mixed dentition with use of removable appliances, 359
impacted canines, 891
of mixed dentition, rational approach to, 610
of typical distoclusion case, 350
employing open-tube appliance, 163
principles and methods of, 832
problems: origin and elimination, 765
research and, subcondylar fractures of mandible, 729
use of tissue-bearing anchorage alone and in conjunction with various techniques in, 407
Tufts College Dental School, 959

U

U. S. Department of Health, Education, and Welfare, Children's Bureau, 76
University of Illinois, 959
of North Carolina, 161, 240, 322, 405
of Tennessee, 161, 240

W

White, Oliver W., honored as outstanding dentist of year in Michigan, 564

Editorials

A Panel Discussion of Orthodontics, 384
Dental Students, 1952-1953, 61
Discussion at Orthodontic Meetings, 145
Guidance for Orthodontists in Prepayment Plans, 711
Orthodontics' Weakest Link, 871
Out of the Mouths of Dental Patients, 634
Social Security, 712
Specialists in Dentistry, 790
The Golden Anniversary of the American Association of Orthodontists, 532
The Necrology Committee of the American Association of Orthodontists, 228

• Betta • STAINLESS STEEL ORTHODONTIC PLIERS

Manufactured from the highest grade of stainless steel and specially formulated for strength and hardness, with an improved **"Shayped"** handle that conforms to the palm of the hand for easy manipulation. Each plier is SAFETY-LIPPED and BOX-LOCK constructed; hand finished by expert craftsmen, guaranteeing a superior, custom styled plier.

HOWE #110 in regular or wide beaks	$7.50
POSTERIOR BAND REMOVER #3	7.50
EDGEWISE #442 for bending edgewise arches	7.50
EDGEWISE #142 with grooves	7.50
EDGEWISE #139	7.50
#53 G narrow tapered point	7.50

TUNGSTEN-CARBALOY Tipped ligature cutting PLIERS

These pliers are unsurpassed in retaining their cutting edge. Guaranteed for one year ---------- $16.50

IMPORTED high carbon steel ligature cutting PLIER

This is by far the best #150 we have had. It will give excellent service -- $ 8.50

IMPORTED ligature SCISSORS

Especially designed for ligature cutting, with a slight overlap at the tip, so that it will cut at the tip. Straight or curved ---------- $ 1.75

FILES

Hand Forged Buccal Tube Files. To clean your Buccal Tubes, not a Tapered Reamer but a file with a true diameter—.036 or .040 ---------- each	$1.00
Knife edge marking file—extra fine quality ----------	1.00
½ Round Gold File—an extra fine Gold File ----------	1.50
Round Edge File—to groove a seat in ½ round shafting for your arch wire	1.00

Pure Gum Crepe
RUBBER

ORTHODONTIC ELASTICS

DON'T Compromise on the "ELASTIC PULL" you desire. One of the following sizes will give you the "OUNCE PULL" you need.

Sizes---2-3-4-5-6-7-8----------	Regular Cut ----------	¼ lb.	$1.10	1 lb.	$4.00
Sizes---2-3-4-5-6-7-8----------	Thin Cut ----------	¼ lb.	1.10	1 lb.	4.00
Size ---1 Regular Cut or Thin Cut----------		¼ lb.	1.35	1 lb.	5.00
Assorted 2 lb. SAMPLE PACKAGE—2 oz. of every Size ----------					9.50

STAINLESS STEEL LIGATURE WIRE—A "Ded-Soft" ligature wire—.008, .010, .011, .012, ½ lb. Spool, **$2.50**; 2 spools, **$4.75**; Random weight spool, 3 to 5 lbs., per lb. ---------- $4.00

HEAD CAPS FOR EXTRA ORAL ANCHORAGE

Sturdily constructed of extra strong inch wide grosgrain ribbon with a fine silk-like finish. Lined at the seams with smooth felt for additional comfort. Made in 6 head sizes for good fit, 21, 21½, 22, 22½, 23, 23½ -- **$1.50** each; **$14.00** doz.

LABORATORY AIDS

Tray-Kleen—dissolves hardened alginates—no scraping—no poking—just soak and wipe.	$2.50
Tray-Brite—cleans and brightens discolored ALUMINUM TRAYS—just soak—rinse and wipe.	2.50
Plier-Luse—to loosen stiff Plier Joints—just soak—rinse—wipe.	2.50
Model Brite—soak your Record Models for 1 hour—rinse—wipe and polish to a high gloss.	2.00

Betta Orthodontic Supplies

"If it's Orthodontic we have it"

123 WEST 64 ST. • NEW YORK 23, N. Y. • SU-7-1418-9

Be Sure You Are Right . . .

DIAGNOSTIC SET-UP
COORDINATED TO THE
FRANKFORT-MANDIBULAR
PLANE ANGLE

THEN Go Ahead With Treatment

THE TOOTH POSITIONER
PATENT NO. 2531222
IN FINEST NATURAL BLACK RUBBER
(PINK IF DESIRED)

MANUFACTURED EXCLUSIVELY BY

LA PORTE TOOTH POSITIONING LABORATORIES
P. O. BOX 73 LA PORTE, INDIANA

ALSO PRODUCERS AND SUPPLIERS OF . . .

SAW FRAMES AND BLADES • DIVIDERS • ELASTIC BANDS • PLIERS • ARCH FORMERS • MODEL TRIMMERS • KNIVES AND SPATULAS • SPECIAL ACTIVATING AND STABILIZING EDGEWISE ARCHWIRE • PRECISION BUCCAL SHEATH MATERIAL • PLASTIC CERVICAL TRACTION TUBES • MODEL STORAGE BOXES • SEPARATING WIRE • RUBBER MOLD BASES • POSITIONER CARRYING CASES WITH PATIENT INSTRUCTIONS • LIGATURE WIRE

INFORMATION ON REQUEST

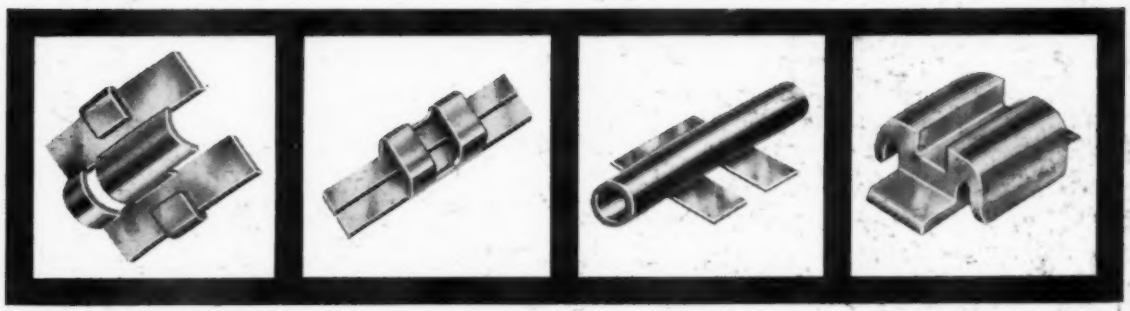
busy day?

*F*requent, aren't they? More appointments than there are hours.

Patients stacking up in the reception room. Each problem more complex and time consuming than anticipated.

Of course, you'll never completely eliminate these days, but we know UNITEK can materially contribute toward reducing the problem.

The smooth, ready-to-use finish and precise uniformity of all UNITEK appliances and materials invariably will speed up your work, save you extra chair time, and add to the patient's comfort.



Unitek CORPORATION

275 NORTH HALSTEAD AVENUE • PASADENA 8, CALIFORNIA

SUPERIOR INCONEL* ORTHODONTIC TUBING

Superior Inconel* Tubing is a nickel, iron and chromium alloy proved ideal for Orthodontic use because of its extreme workability.

RECTANGULAR

Edgewise rectangular tubing measures .022" x .028" inside diameter x .015" wall and is offered in ⅛, ¾, ¼ and ⅜ inch cut lengths.

HALF ROUND

New half round lingual tubes. To meet the needs of Orthodontists, Superior has produced a new half round tube which offers a much snugger fit over 14 gauge half round shafting material. Lingual tubes are cut .100" long and measure .064" x .032" inside diameter x .016" wall.

ROUND TUBING

Standard Sizes

.022/.023"	ID x .035"	OD—Takes two .010" or .011" wires
.022/.023"	ID x .039/.040"	OD—Takes two .010" or .011" wires
.036⅝/.037⅝"	ID x .058"	OD—Takes an .036" wire or .035" OD end tubing
.040⅝/.041⅝"	ID x .062"	OD—Takes an .040" wire or .039/.040" OD end tubing
.046/.047"	ID x .072"	OD—Takes an .045" wire
.048/.049"	ID x .080/.085"	OD—Takes an .047" wire

*Inconel—T.M. Reg. International Nickel Co.

SUPERIOR INCONEL OFFERS:

More Corrosion Resistance

Superior Inconel Tubes stay bright and tarnish-free in the presence of oral acids and saliva.

Better Wear Resistance

Tubes of hard, tough Superior Inconel withstand heavy wire wear during fitting and after many adjustments.

Increased Workability

Superior Inconel Tubes are readily soldered to precious metals or stainless steel bands using a low fusing silver solder with water soluble flux.

LENGTHS

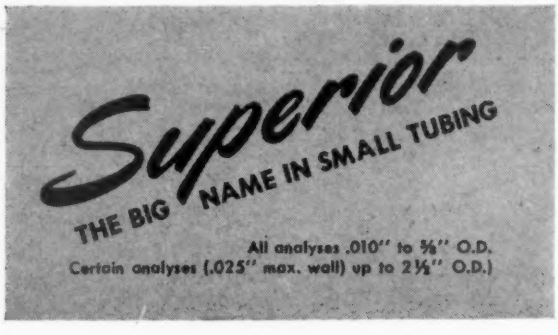
Round tubing is available in either ½′ random; 1′ cuts; cut lengths to your requirements.

MINIMUM ORDER QUANTITIES

500 pieces per size for cut pieces
50′ per size on all random and 1′ cuts

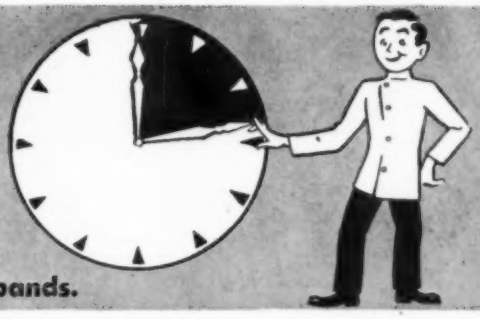
SAMPLES

For proof in your own office, send for samples and a price schedule today. Write Superior Tube Company, 2026 Germantown Avenue, Norristown, Pennsylvania.



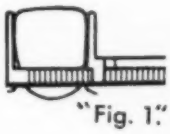
HERE'S HOW

To cut anterior band fitting time and costs, while providing better fitting and more attractive anterior bands.



1. Get an introductory selection of Rocky Mountain Tru-Form Anterior Bands, which are supplied in 14 graded sizes and in either wide or narrow widths.

2. To fit the upper anteriors take mesial distal measurement of upper central tooth, (Fig. 1.) Compare measurement to size chart and select proper size.
(If too large or too small, go up or down a size.)


"Fig. 1."

H. 8.
I. 8.5
J. 9.
K. 9.75
L. 10.50

3. Weld anterior band seating lug on lingual, (Fig. 2.)

"Fig. 2."

4. Harden labial slightly with 114 plier and bring in gingival of mesial and distal slightly with 114 plier, (Fig. 3.)

" Fig. 3."

5. Push on tooth and to finish seating rest Eby Band Driver on band seating lug and tap band to desired position. (Fig. 4.)

"Fig. 4."

6. **Rules of Thumb for sizing bands to other teeth**

   a. For upper laterals just drop down three sizes from size used for central. Example: if you used a J band for the central, you will use a G band for the lateral.
   b. Lower centrals take either size C or D or occasionally one size smaller or larger.
   c. To fit the lower laterals, just go up one size larger than the size used for the lower central.

SAVE EVEN MORE TIME

By using Rocky Mountain preformed anterior bands with your favorite attachment already prewelded.

If you wish an introductory assortment of these bands or a copy of Rocky Mountain's new Band Technique Booklet, just check and mail the coupon below.

TRU-CHROME HIGHEST QUALITY

ROCKY MOUNTAIN METAL PRODUCTS CO.

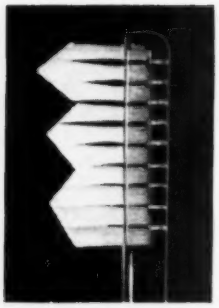
BOX 1887 — DENVER 1, COLORADO

TRU-CHROME HIGHEST QUALITY

Send me introductory anterior band assortment kit
(6 doz.) $12.00 Wide ☐ Narrow ☐
Send me the new Band Technique Booklet ☐

AJ0409

Dr. _____
_____
_____



The NEW short bristle

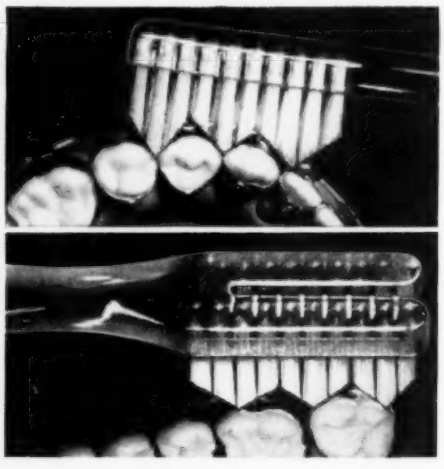
BI-PO "shorty"

ORTHODONTIC

Contour-trim multituft

- Spaced to clear wires
- Long end-tuft for picking
- Reaches second molars
- Children like it

Other models: Dual Action, *flat trim*... General, *separated tufts*



Free sample on request

Send your druggist's name & address.
For professional rate, order from
UNITEK CORP., 275 N. Halstead Ave.
Pasadena 8, California

BI-PO
ORTHODONTIC ®

BI-PO COMPANY, Box 737, Palo Alto, Calif.

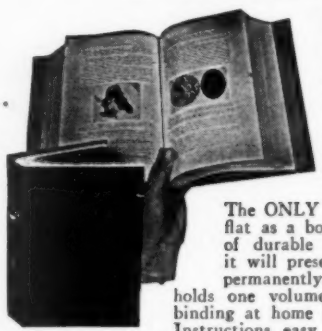
Help Polio Patients!

Join the
MARCH OF DIMES
January 3-31

Orthodontist or general man with orthodontic training and experience to take over well-established practice. Will stay six months as associate. Have to retire because of ill health. Address Box JO, American Journal of Orthodontics, 3207 Washington Blvd., St. Louis 3, Mo.

FLORIDA—For sale, Orthodontic practice in one of Florida's fastest growing cities. An extremely attractive location, all new equipment, office air-conditioned. In less than two years grossing $16,000. Owner called into service. Address Box CR, American Journal of Orthodontics, 3207 Washington Blvd., St. Louis 3, Mo.

A Handsome Permanent Binder for American Journal of Orthodontics



Note Prices:
Single Binder —$3.25 each. For 2 or more of same publication— $2.75 each.

The ONLY binder that opens flat as a bound book! Made of durable imitation leather, it will preserve your journals permanently. Each cover holds one volume. Do your own binding at home in a few minutes. Instructions easy to follow. Mail coupon for full information and binder on 10-day free trial.

——— MAIL COUPON TODAY ———
SUCKERT LOOSE LEAF COVER CO.
234 W. Larned St., Detroit, Michigan

Mail _____ binders for American Journal of Orthodontics _____
Will remit in 10 days or return binders.

Name _____

Address _____

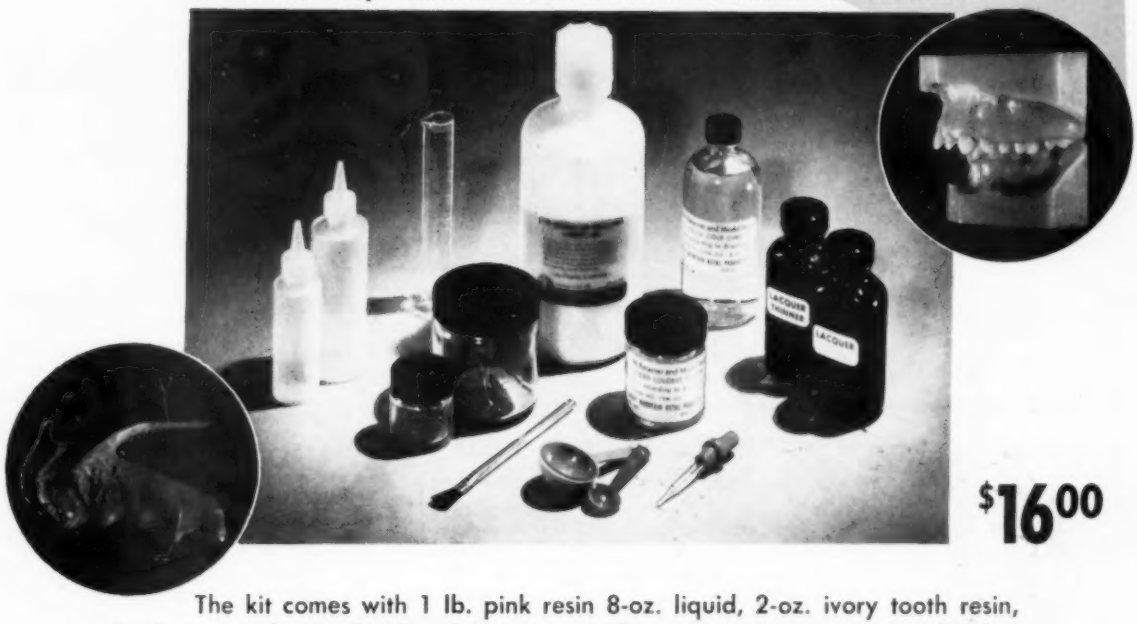
City _____ State _____

Postage prepaid in U. S., Foreign countries extra.

R. M. MULTI PURPOSE
Model and RETAINER
RESIN KIT

You will find this modern cold cure resin ideal for a number of orthodontic uses,

For: 1. Quick spray-on technique for making retainers directly on models.
2. Orthodox retainer making, using flask.
3. Quick repairs.
4. Attractive study models for clinics and for those EXTRA SPECIAL CASES.



$16.00

The kit comes with 1 lb. pink resin 8-oz. liquid, 2-oz. ivory tooth resin, 2 plastic applicator bottles, lacquer and thinner, graduate, spoons, bottles, brushes, and all items needed for special model pouring technique.

It is also worth noting that the pound of pink resin is supplied in a useful 1 qt. polyethylene bottle, which you can find a number of uses for. We are sure you will like it.

If you wish a kit, check and mail the coupon return. Your requests will be forwarded immediately.

TRU-CHROME
HIGHEST QUALITY

AJO 416

ROCKY MOUNTAIN METAL PRODUCTS CO.
P. O. BOX 1887 **DENVER 1, COLO.**

TO DR.....

ADDRESS.....

CITY.....ZONE.....STATE.....

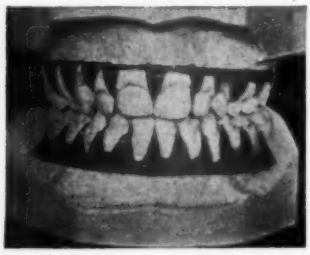
Please send
☐ R.M. Multi Purpose Resin Kit $16.00

NEW *Acrycett* IMPROVED

ORTHODONTIC POSITIONERS

WITH A HARD OCCLUSAL INSERT

I. After bands are removed.



II. "set-up" by Acrycett from which appliance is constructed.

III. Appliance in position.

An Approved Appliance to Assure Your Cases an Esthetic, Functional and Successful Completion

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

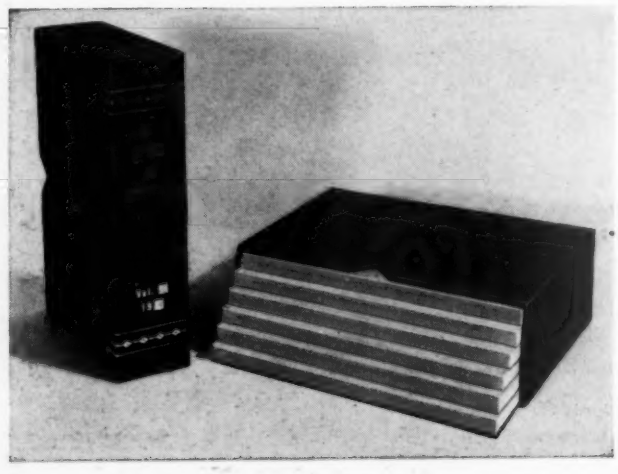
CONTROL MOUTH BREATHING

Reduce common respiratory infections of childhood with proper breathing. Promote chest muscle and lung development with the Acrycett Mouth Breathing Eliminator.

Full information available upon request.

Acrycett 634 S. Western Ave.

Los Angeles 5, Calif. Ph: DUnkirk 8-3914



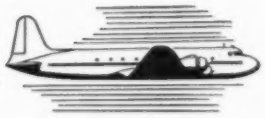
Preserve Your Journals With This *Jesse Jones* Volume File

Specially designed and produced for *American Journal of Orthodontics,* this file will keep one volume, or twelve issues, clean, orderly and readily accessible. Picture this distinctive, sturdy Volume File on your bookshelf. Its rich red and green Kivar cover looks and feels like leather, and the 16-carat gold leaf hot-embossed lettering makes it a fit companion for your finest bindings.

The Volume File is reasonably priced, in spite of its costly appearance. It is sent postpaid, carefully packed, for $2.50 each. Most subscribers will find it more convenient and economical to order 3 for $7.00 or 6 for $13.00. When ordering specify file for *American Journal of Orthodontics.* Send check with order. *Satisfaction guaranteed.* Can be sent to U.S. and Possessions only. For prompt shipment, order direct from

Jesse Jones & Hauck Box Corps. (Since 1843)

FOURTH AND THOMPSON STREETS, PHILADELPHIA 22, PENN.



Now-Immediately Available to you by Air Mail!

Thanks to You!

Once again, we feel indebted to the Orthodontists of our country for their valued acceptance of the Wilkinson Company and its products. We hope that we may continue to be of service to you in future years. Your satisfaction is of utmost importance to us, and we want you to know that we welcome your suggestions and recommendations. It has been our pleasure to serve so many of you, and a continuance of this association is our prime desire.

In deepest sincerity, we wish each of you
A Merry Christmas and a Happy New Year.

WILKINSON

ALWAYS GOOD GOLD

W

51

THE WILKINSON COMPANY, P. O. BOX 303, SANTA MONICA, CALIFORNIA

A MODERN DENTAL REFERENCE LIBRARY

PERIODONTIA—A Study of the Histology, Physiology, and Pathology of the Periodontium, and the Treatment of Its Diseases. By HENRY M. GOLDMAN, D.M.D., THIRD EDITION. 790 pages, 525 illustrations, 12 in color. PRICE, $16.00.

BIOCHEMISTRY OF THE TEETH—By HENRY M. LEICESTER, Ph.D., 306 pages, illustrated. PRICE, $5.50.

OUTLINE OF HISTOLOGY—By MARGARET M. HOSKINS, Ph.D., and GERRITT BEVELANDER, Ph.D., SECOND EDITION. 112 pages, illustrated. Size: 9x11-in. PRICE, $3.50.

DENTAL CARIES—Mechanism and Present Control Technics as Evaluated at the University of Michigan Workshop. Edited by KENNETH A. EASLICK, A.M., D.D.S., 234 pages, illustrated. PRICE, $5.50.

RESTORATIVE DENTISTRY—By JEROME M. SCHWEITZER, B.S., D.D.S., 511 pages, 1014 illustrations. PRICE, $16.00.

ORAL REHABILITATION—By JEROME M. SCHWEITZER, D.D.S. 1161 pages, 1157 illustrations. PRICE, $21.00.

BONE AND BONES—Fundamentals of Bone Biology. By JOSEPH P. WEINMANN, M.D., and HARRY SICHER, M.D., 464 pages, 289 illustrations. PRICE, $10.00.

DENTAL PROSTHETIC LABORATORY MANUAL—By CARL O. BOUCHER, D.D.S., 410 pages. PRICE, $4.75.

COMPLETE DENTURES—By MERRILL G. SWENSON, D.D.S., F.I.C.D., F.A.C.P., 735 pages, 882 illustrations, 10 in color. PRICE, $13.50.

ORAL SURGERY—By KURT H. THOMA, D.M.D., SECOND EDITION, IN TWO VOLUMES. 1688 pages, 1789 illustrations, 121 in color. PRICE, $30.00.

ORAL PATHOLOGY—By KURT H. THOMA, D.M.D., THIRD EDITION. 1536 pages, 1594 illustrations, 92 in color. PRICE, $22.50.

ANESTHESIA IN DENTAL SURGERY—By STERLING V. MEAD, D.D.S., SECOND EDITION. 638 pages, 223 illustrations. PRICE, $12.50.

BASIC PRINCIPLES AND TECHNICS FOR COMPLETE DENTURE CONSTRUCTION—By VICTOR H. SEARS, D.D.S. 416 pages, illustrated. PRICE, $5.50.

PHARMACOLOGY AND DENTAL THERAPEUTICS—By EDWARD C. DOBBS AND HERMANN PRINZ. TENTH EDITION. 599 pages, 35 illustrations. PRICE, $9.00.

PRINCIPLES AND PRACTICE OF EXODONTIA—By Frank W. Rounds, A.B., D.D.S., Sc.D., and Charles E. Rounds, A.B., D.M.D. 407 pages, 365 illustrations. PRICE, $10.00.

Theory and Practice of CROWN AND BRIDGE PROSTHESIS—By STANLEY D. TYLMAN, A.B., D.D.S., M.S., F.A.C.D., SECOND EDITION. 960 pages, 1273 illustrations, 9 in color. PRICE, $13.50.

PRACTICAL ORTHODONTICS—(Original Text by the Late Martin Dewey) By GEORGE M. ANDERSON, D.D.S., SEVENTH EDITION. 556 pages, 640 illustrations. PRICE, $10.50.

ORAL PHYSIOLOGY—By John T. O'Rourke, B.S., D.D.S., Sc.D., and edited by Leroy M. S. Miner, M.D., D.M.D., Sc.D., Dr. P.H. 333 pages. PRICE, $5.50.

ORAL HISTOLOGY AND EMBRYOLOGY—Edited by BALINT ORBAN, M.D., D.D.S., SECOND EDITION, 350 pages, 265 illustrations, 4 in color. PRICE, $8.50.

ORAL ANATOMY—By HARRY SICHER, M.D., SECOND EDITION, 529 pages, 310 illustrations, 24 in color. PRICE, $13.50.

DENTAL ANATOMY—By ROBERT C. ZEISZ, D.D.S., F.A.C.D., F.I.C.S., and JAMES NUKOLLS, D.D.S., F.A.C.D., 486 pages, 427 illustrations. PRICE, $10.00.

ADVANCED RADIODONTIC INTERPRETATION—By CLARENCE O. SIMPSON, M.D., D.D.S., F.I.C.D., 78 pages, 150 illustrations on 10 full page inserts. PRICE, $10.50.

REVIEW OF DENTISTRY—Edited by JAMES T. GINN, B.S., D.D.S., 824 pages. PRICE, $6.25.

DOCTOR AND PATIENT AND THE LAW—By LOUIS J. REGAN, M.D., LL.B., SECOND EDITION. 545 pages. PRICE, $10.50.

An Introduction to the HISTORY OF DENTISTRY—By BERNHARD WOLF WEINBERGER, D.D.S., IN TWO VOLUMES. 1008 pages, 313 illustrations. PRICE, $12.50.

ESSENTIALS OF ORAL SURGERY—By V. P. BLAIR, M.D., F.A.C.S., and ROBERT H. IVY, M.D., D.D.S., F.A.C.S. Collaboration of JAMES BARRETT BROWN, M.D., F.A.C.S., FOURTH EDITION. 635 pages, 485 illustrations. PRICE, $8.50.

DISEASES OF THE MOUTH—By STERLING V. MEAD, D.D.S., FIFTH EDITION. 1050 pages, 633 illustrations, 63 in color. PRICE, $13.50.

ORAL SURGERY—By STERLING V. MEAD, D.D.S., FOURTH EDITION. 1478 pages, 872 illustrations, 16 color plates. PRICE, $25.00.

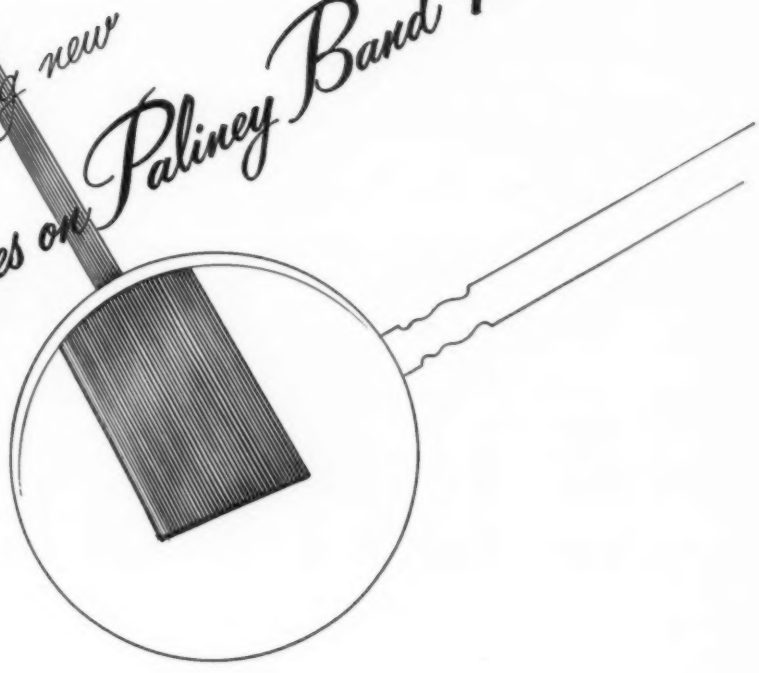
PHYSIOLOGICAL FOUNDATION OF DENTAL PRACTICE—By L. L. LANGLEY and E. CHERASKIN. 512 pages, 149 illustrations. PRICE, $8.75.

TEXTBOOK OF EXODONTIA—By LEO WINTER, D.D.S. Revised by William F. Harrigan, D.D.S., and Leo Winter, D.D.S., 6th edition, 350 pages, 156 illustrations. PRICE, $8.00.

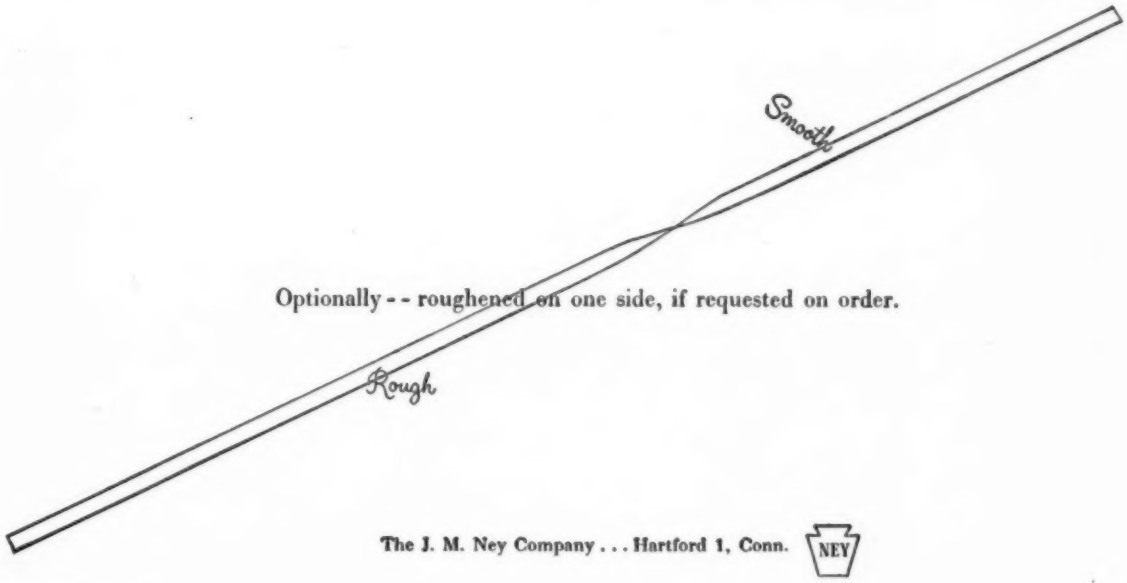
The C. V. MOSBY CO., Publishers, St. Louis 3, Mo.

Something new

Rounded edges on Paliney Band Materials



Polished rounded edges are now standard
on all Paliney Band Materials.
Two alloys ... Medium-Hard and Hard.



Optionally -- roughened on one side, if requested on order.

The J. M. Ney Company ... Hartford 1, Conn.

SPECIAL ANNOUNCEMENT

The Elgin National Watch Company is pleased to announce that the Rocky Mountain Metal Products Company, Denver, Colorado, has been appointed the dental profession's exclusive source for ELGILOY in the United States and foreign countries.

ELGILOY

Elgiloy is a patented wonder metal of modern metallurgy. Besides its use for our famous DURA-POWER MAIN SPRING —*"the heart that never breaks"*— in our fine time pieces. Elgiloy has many other promising possibilities, particularly in Dentistry and ORTHODONTICS.

Although Rocky Mountan has been working on applications for Elgiloy in orthodontics for some time, their specialties are not yet ready for distribution. When they are, we are certain you will be most interested in Rocky Mountain's announcements.

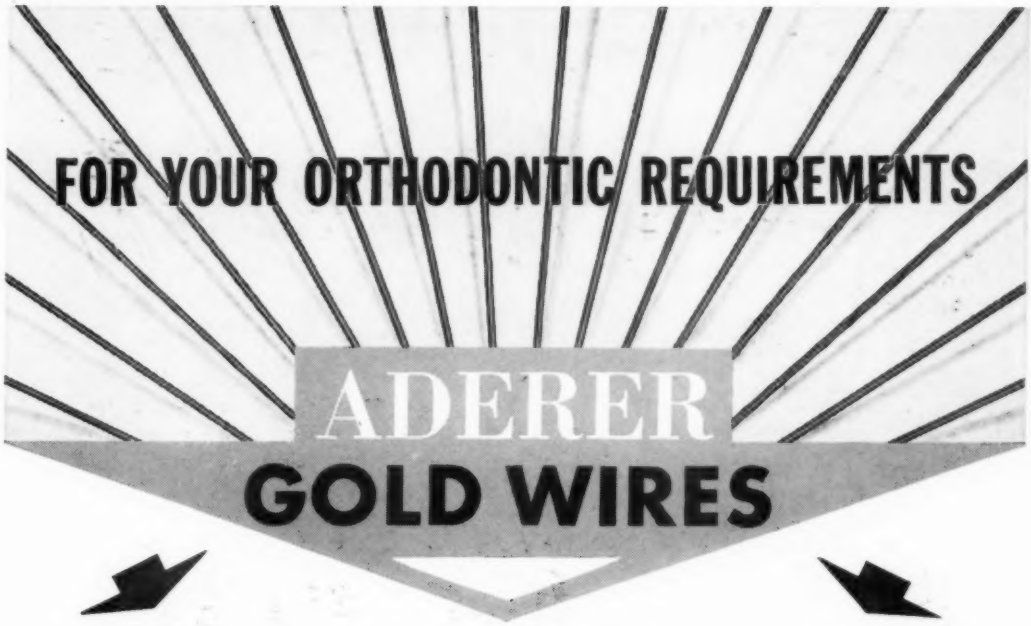
ELGIN NATIONAL WATCH COMPANY

ABRASIVES DIVISION ELGIN, ILLINOIS

ROCKY MOUNTAIN METAL PRODUCTS CO.

BOX 1887, DENVER 1, COLORADO, U.S.A.

The Pioneers for Spot Welders and Chrome Alloys for Orthodontics and Dentistry for Children



ADERER NO. 4 WIRE:

This high-fusing platinum gold alloy provides great strength, elasticity and pliability. It is highly recommended for base wire, main and auxiliary wires such as finger springs — and for applications requiring a high degree of elasticity.

ADERER NO. 3 WIRE:

This is one of the finest wires available. It is an alloy of platinum and gold, well-adapted for orthodontic work. Despite its lower cost, it is high-fusing, has the same elastic qualities as No. 4 Wire but offers slightly less resistance to rupture.

ADERER NO. 1 WIRE:

A platinum-gold alloy wire used successfully for the same purposes as No. 4 Wire and with the same technique. Although its fusion temperature is somewhat lower than No. 4, it still may be used with any good grade of solder. The properties of No. 1 Wire are superior to many competitive higher-priced wires.

MULTI-ORTHO WIRE:

Here, low cost and low specific gravity provide advantageous economy in a high-fusing wire with exceptionally fine tempering qualities.

ADERER WIRES ARE AVAILABLE IN ALL GAUGES AND SHAPES—ROUND, HALF-ROUND, SQUARE AND RECTANGULAR

PHYSICAL PROPERTIES OF ADERER GOLD ORTHODONTIC WIRES

NAME	ULT. TENSILE STRENGTH	PROPORTIONAL LIMIT	FUSION TEMP. °F	ELONGATION IN 2"	YIELD PT. STRAIN	COOLING PERIOD MIN.	COLD BENDS
ADERER NO. 4 WIRE	114,500 Q 153,400 OC	74,400 117,600	1877	18 6.5	.00735	30	5.5 3.5
ADERER NO. 3 WIRE	108,300 Q 150,500 OC	63,600 107,500	1835	23 6.	.0076	30	5 2.5
ADERER NO. 1 WIRE	110,000 Q 173,500 OC	60,000 110,000	1762	19 5.5	.0069	30	5 2.5
MULTI-ORTHO WIRE	92,400 Q 130,400 OC	63,000 110,600	1710	18 3	over .0085	30	4 2.5

ADERER GOLDS
Julius Aderer, Inc., New York · Chicago

JULIUS ADERER, INC. • 219 E. 44th ST., N. Y. • 55 E. WASHINGTON ST., CHICAGO

SEPARATED... *even at Christmas*

There are many mothers who have never held their babies in their arms . . . even at Christmas. These mothers have tuberculosis, contagious and deadly unless it is detected and treated in time.

Yet TB can someday be eliminated from the earth . . . and you can help hasten that day by buying Christmas Seals.

This year go all out . . . with two or more Seals on every card, letter, or package you send at Christmas time!

buy Christmas Seals

PLAY IT SAFE!

STOP ARTHRITIS

Support—
THE ARTHRITIS AND RHEUMATISM FOUNDATION

The Arthritis and Rheumatism Foundation nationally sponsors the basic and clinical research that may someday answer such questions as why arthritis flourishes and is aggravated by mental and physical stress and strain and anxiety and shock, and thereby help prevent and perhaps even stop arthritis.

NOW READY–New 4th Edition

ORAL PATHOLOGY

A Histological, Roentgenological, and Clinical Study of the Diseases of the Teeth, Jaws, and Mouth

By KURT H. THOMA, D.M.D., F.D.S.R.C.S.,Eng., Hon. F.D.S.R.C.S.Edin.

Professor of Oral Surgery, Emeritus, and Brackett Professor of Oral Pathology, Emeritus, Harvard University; Honorary Professor of the Odontologic Faculty, San Carlos University, Guatemala; Visiting Lecturer in Oral Surgery, Graduate School of Medicine, University of Pennsylvania; Member of Board of Consultation, Formerly Oral Surgeon and Chief of Dental Service, Massachusetts General Hospital; Oral Surgeon to Brooks Hospital; Consulting Oral Surgeon, New England Baptist Hospital, Beth Israel Hospital, Tumor Department of Boston Dispensary, New England Center Hospital, Faulkner Hospital; Consultant in Oral Surgery, U. S. Public Health Service Hospital, Boston; Consultant in Oral Surgery, Veterans Administration Hospitals, Providence, R. I., and West Roxbury, Mass.; Consultant in Oral Surgery to the Surgeon General, Washington, D. C.; and Consultant in Oral Pathology, Armed Forces Institute of Pathology, Washington, D. C.

Fourth Edition—1536 pages, with 1594 illustrations in the text, including 92 in colors. Price, cloth binding, $22.50.

• Another edition of *Oral Pathology* is herewith presented to the profession. Several important changes have been made in order to adjust this book to the present requirements as a text for students of oral pathology. These changes, however, will in no way detract from its value as an aid in diagnosis of both common and rare diseases seen by the clinician.

• The chapter on dental caries has received particular attention. It has been completely reorganized and brought up to date. This task has not been an easy one because of the voluminous and in part controversial literature that has been published during the past decade. The extensive research work that has been carried on to find the exciting causes and predisposing factors and the variety of studies made to determine the progress of the disease and methods of its prevention have made it necessary to review a large number of articles in both the American and foreign dental journals. An attempt has been made to present the most important views on the subject and to include and coordinate the findings of the large group of investigators who have been active in this field of oral pathology.

• The chapters on experimental pathology have been eliminated in order to make room for additional material in other parts of the text. However, some of the pertinent findings discovered by animal experimentation have been retained by transferring them to the chapters dealing with the respective human diseases.

ORDER FORM

The C. V. MOSBY COMPANY, 3207 Washington Blvd., St. Louis 3, Mo.

Please send me:

4th Edition—Thoma—ORAL PATHOLOGY—Price $22.50

☐ Enclosed find check. ☐ Charge my account.

Name ----------

Address ----------

MJ

INDEX TO ADVERTISERS

Please mention "American Journal of Orthodontics" when writing to our advertisers—it identifies you

Acrycett ---------- 10
Aderer, Inc., Julius ---------- 15
Arthritis and Rheumatism Foundation, The ---------- 16

Baker & Co., Inc. ---------- 1
Betta Orthodontic Supplies ---------- 3
Bi-Po Company ---------- 8

Christmas Seals ---------- 16

Jesse Jones Journal Volume File ------ 10

LaPorte Tooth Positioning Company --- 4

March of Dimes ---------- 8

Ney Company, The J. M. ---------- 13

Orthodontic Practice Wanted ---------- 8
Orthodontic Practice for Sale ---------- 8

Publishers' Authorized Bindery Service 18

Rocky Mountain Metal Products Company ---------- 7, 9, 14

Suckert Loose Leaf Cover Company ---- 8
Superior Tube Company ---------- 6

Unitek Corporation ---------- 5

White Dental Mfg. Company, The S. S. ---------- Fourth Cover
Wilkinson Company, The ---------- 11
Williams Gold Refining Company, Inc. ---------- Second Cover

An Authorized Binding for

AMERICAN JOURNAL OF ORTHODONTICS

Arrangements have been made by The C. V. Mosby Company for subscribers to have their journals bound into distinctively designed books.

Twelve issues, January through December, bound in best grade dark spruce, washable buckram, imprinted with your name on cover, cost but $3.45 per volume.

Bound journals serve as an immediate reference for research and information. Properly displayed, they create a psychological impact on the patient, implying the time and effort spent to keep up to date on the most modern techniques and treatments.

Ship journals parcel post. Within thirty days after receipt, bound volumes will be shipped prepaid anywhere in the U.S.A. Full remittance must accompany order.

PUBLISHERS' AUTHORIZED BINDERY SERVICE
(Binders of all Journals)
308 West Randolph Street **Chicago 6, Illinois**

AMERICAN JOURNAL OF ORTHODONTICS

Published by THE C. V. MOSBY COMPANY, 3207 Washington Blvd.
St. Louis 3, U. S. A.

Entered at the Post Office at St. Louis, Mo., as Second-class Matter

Published Monthly. Subscriptions may begin at any time.

Official Publication of The American Association of Orthodontists,
its component societies and The American Board of Orthodontics

Editor-in-Chief
H. C. Pollock, St. Louis, Mo.
Assistant Editor—Earl E. Shepard, St. Louis, Mo.
Editor of Abstracts and Reviews—J. A. Salzmann, New York, N. Y.

Sectional Editors

Charles R. Baker, Evanston, Ill.
Henry D. Cossitt, Toledo, Ohio
Joseph D. Eby, New York, N. Y.
William E. Flesher, Oklahoma City, Okla.
Henry F. Hoffman, Denver, Colo.
Stephen C. Hopkins, Washington, D. C.
James D. McCoy, Beverly Hills, Calif.
Oren A. Oliver, Nashville, Tenn.

EDITORIAL COMMUNICATIONS

Original Communications.—Manuscripts for publication and correspondence relating to them should be sent to Dr. H. C. Pollock, 8015 Maryland Ave., St. Louis 5, Mo., U. S. A.

Manuscripts should be typewritten on one side of the paper only, with double spacing and liberal margins. References should be placed at the end of the article and should include, in the order given, name of author, title, journal, volume, pages, and year; e.g., Smith, E. J.: Children's Dentistry, Am. J. Orthodontics, 34: 1-25, 1947. Illustrations accompanying manuscripts should be numbered, provided with suitable legends, and marked lightly on back with author's name. Articles accepted for publication are subject to editorial revision. Neither the editors nor the publishers accept responsibility for the views and statements of authors as published in their "Original Articles."

Illustrations.—A reasonable number of half-tone illustrations will be reproduced free of cost to the author, but special arrangements must be made with the editor for color plates, elaborate tables or extra illustrations. Copy for zinc cuts (such as pen drawings and charts) should be drawn and lettered only in India ink, or black typewriter ribbon (when the typewriter is used), as ordinary blue ink or colors will not reproduce. Only good photographic prints or drawings should be supplied for half-tone work.

Books for Review.—Only such books as are considered of interest and value to subscribers will be reviewed, and no published acknowledgment of books received will be made. These should be sent to Dr. J. A. Salzmann, 654 Madison Ave., New York City.

Reprints.—Reprints of articles must be ordered specifically, in separate communication to the publishers, The C. V. Mosby Company, 3207 Washington Blvd., St. Louis 3, Mo., U. S. A., who will send their schedule of prices. Individual reprints of an article must be obtained through the author.

BUSINESS COMMUNICATIONS

Business Communications.—All communications in regard to advertising, subscriptions, change of address, etc., should be addressed to the publishers, The C. V. Mosby Company, 3207 Washington Blvd., St. Louis 3, Mo.

Subscription Rates.—United States and Possessions, $10.00 per year, Canada, $10.25, Foreign, $11.00. Single copies, United States, $1.10, Canada, $1.10, Foreign, $1.30.

Remittances.—Remittances for subscriptions should be made by check, draft, post-office or express money order, payable to the publishers, The C. V. Mosby Company.

Change of Address.—The publishers should be advised of change of subscriber's address about fifteen days before the date of issue, with both new and old addresses given.

Advertisements.—Only articles of known scientific value will be given space. Forms close first of month preceding date of issue. Advertising rates and page sizes on application.

Bound Volumes.—The Book Shop Bindery, 308 West Randolph Street, Chicago 6, Illinois, will be glad to quote prices for binding complete volumes in permanent buckram.

S·S·White PRECIOUS METAL WIRES for Arches and Springs

NO. 61 METALBA—Platinum Color

A high-grade, exceptionally strong, tough, springy wire. No. 61 Metalba is the highest grade orthodontic wire of our manufacture. It is high fusing, and maintains its high physical properties after soldering operations.

GOLD PLATINUM—Gold Color

Gold Platinum Wire has been proving its merits for all types of arches and springs for more than a quarter century. It's easy working, strong, tough, springy, and doesn't "tire" or lose its elasticity while orthodontic treatments are in progress.

NO. 12 CLASP

A high-grade wire with physical properties that rival closely those of the highest priced orthodontic wires. It's almost as strong as the strongest, moreover, it is very tough and elastic, and an exceptional arch wire.

S. S. WHITE METALBA BRAND BAND MATERIAL

A high-fusing, non-tarnishing all precious metal, medium hard band material, costing little more than base metal products. It's easy working, tough, and has good strength—sufficient for all orthodontic purposes. Metalba Band Material requires no particular heat treatment. It is high fusing and gold solder of any fineness may be used with it.

ALL MADE IN POPULAR GAGES AND WIDTHS

THE S. S. WHITE DENTAL MFG. CO., 211 S. 12th STREET, PHILADELPHIA 5, PA.